ANTHROPOLOGICAL PAPERS

OF THE

American Museum of Natural History.

Vol. VI, Part II.

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THE PREHISTORIC ETHNOLOGY OF A KENTUCKY SITE.

BY

HARLAN I. SMITH.

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HARLAN I. SMITH.

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Introduction.

The Fox Farm is situated in Mason County, Kentucky, about fourteen miles south southwest from Maysville, three miles north from May's Lick, and one mile west of the road leading from May's Lick to Maysville. It is not far from the historic Washington, made famous by Harriet Beecher Stowe in "Uncle Tom's Cabin." It is in the Algonkin linguistic area. The land is rolling, and cut by numerous creeks which discharge into the north fork of the Licking River and so their waters eventually reach the Ohio. These streams cut through nearly horizontal strata of the fossiliferous limestone of the Ordovician (Lower Silurian). The Fox Farm lies on Lower Maysville and Upper Eden, formerly supposed to be about the equivalent of the Lorraine and Utica of the New York series. The Eden consists of shale and thin limestones, the latter of which tend to slip out on the surface of the steep hillsides under the action of frost and rain. Many of these are carried by water some distance down stream, and in places are deposited in such a way as to resemble a pavement, each piece standing on edge, but leaning down stream. The Eden outcrop is always marked by steep slopes and a relatively poor soil; the overlying Maysville, however, gives rise to good soil. Many of these slabs of limestone were carried by the prehistoric people of this vicinity to the top of the high land lying between the streams and there used in the construction of graves. There are numerous salt springs in the neighborhood which in early historic times and before, were visited by deer and other animals for the purpose of licking the salt deposited about their edges. Consequently, many of the names of the nearby villages terminate in the word "Lick." The country was heavily wooded and timber was so common that even at the time of our work there (1895) rail fences could be seen which contained rails of the now valuable black walnut.

A large prehistoric village site, a number of graves, and mounds situated on the higher part of this farm near three natural sink holes where the underlying lime rock has dissolved have been known for many years. While Prof. Cyrus Thomas,[1] refers to an enclosure known as "Fox's Fort," probably one of the sink holes, three miles northwest of May's Lick, which was reported to him by Mr. Gerard Fowke, no full account of them has been published, nor are there in any publication illustrations and descriptions

[1] Thomas, p. 98.

characterizing the culture of the people who formerly lived there. Specimens have been collected on the surface of this site, especially by Mr. Gerard Fowke and by Col. Frederick H. Bierbower of Maysville as well as by casual visitors to the place. A considerable collection from this site may be seen in the Museum of the Public Library at Maysville.

During June, July, and August, 1895, I made a series of explorations on the Fox Farm and a reconnoissance of the vicinity for the American Museum of Natural History. Professor Frederick W. Putnam, at that time Curator of Anthropology in the Museum, planned for me to continue these explorations during the subsequent year and to complete them, but no appropriation was made the next year for continuing the work and the American archaeological work of the Jesup North Pacific Expedition engaged my attention during the following years. We have a very large, and judging from the artifacts usually found in the Ohio Valley, a rather complete collection from this place.[1] There is considerable literature regarding the archaeology of the general region and for this reason we may omit a detailed report on this work and attempt a characterization of the culture of the prehistoric inhabitants, especially for comparison with the results of later work in Ohio in a similar culture, carried on by Mr. William C. Mills.[2]

The age of this village site is unknown. Glass beads, arrow points of iron, iron tomahawks, trade pipes, or similar articles showing evidence of contact with whites were not found. The oldest families in the neighborhood who have lived there for several generations have no knowledge or traditions of anyone having inhabited the place except their own people, or of anyone who made burials there. On the other hand, there is no positive evidence pointing to its great antiquity. The finds have been compared with those made by Mills at the Adena Mound and at the Gartner Mound and village site which are between 66 and 80 miles northeast, as the "crow flies," from the Fox Farm.

The accompanying illustrations of artifacts are from photographs by Mr. William C. Orchard, and show the objects one half natural size, those of field views are from negatives by the writer. The drawings are by Miss Ruth B. Howe. The animal bones have been identified by Dr. W. D. Matthews and Mr. Barnum Brown. Mrs. Fanny E. Fox gave us permission to explore on her land; Dr. Charles L. Metz of Madisonville, Ohio, made arrangements for our explorations and caused preliminary prospecting excavations to be made by several of my former workers; Col. Frederick

[1] Smith, (e).
[2] Mills, (a), and (b).

H. Bierbower of Maysville, assisted us in various ways, and we were treated most hospitably by Mrs. Fox's family, and the other people of the vicinity. In the field I was assisted by Dr. Cleveland Abbe, Jr., and by Mr. George L. Hamilton. Miss Edith I. Demerell and Miss Bella Weitzner assisted in preparing the manuscript for the press and in reading proof.

New York City,
December, 14, 1910.

Resources in Animal and Plant Materials.

The prehistoric people of the Fox Farm, as indicated by the results of these explorations, depended on a variety of natural products; but no indications were found that they relied particularly upon any one staple resource. Some of the animal and plant materials used are suggested by the specimens, shown in Plates XVII–XIX, which were found in excavating in the village site and also in the earth of which the mounds were made, evidently scraped up from the adjacent surface of the surrounding village site.

Food. For food, they could choose from black bear (Plate XVII, Fig. 1), deer (Plate XVII, Fig. 2), elk (Plate XVII, Fig. 3), raccoon (Plate XVII, Fig. 4), opossum (Plate XVIII, Fig 7), woodchuck (Plate XVIII, Fig. 8), bea ar (Plate XVIII, Fig. 9), red or fox squirrel (Plate XVIII, Fig. 10), wild turkey (Plate XVIII, Fig. 2), duck (Plate XVIII, Fig. 3), turtle (Plate XIX, Figs. 1–2), and fish (Plate XIX, Fig. 3), as shown by the bones of these animals. In the Adena Mound of Ohio, Mills found bones of the black bear, Virginia deer, elk, raccoon, otter, beaver, wild turkey, trumpeter swan, and great horned owl, and incisors of the beaver.[1] In the Gartner Mound, as indicated by the finds of bones and shells, he found black bear, deer, elk, wolf, gray fox, beaver, raccoon, mountain lion, wild cat, Indian dog, muskrat, ground hog, opossum, rabbit, mink, squirrel, wild turkey, wild goose, trumpeter swan, great horned owl, fresh water drum and mussels.[2] The remains of seventeen different animals were found in the adjacent Gartner village site among which were the elk, Virginia deer, which constituted about half the large animal bones, black bear, gray wolf, gray fox, mountain lion, wild cat, beaver, raccoon, opossum, mink, muskrat, rabbit, skunk, ground hog, otter, Indian dog, wild turkey which made up

[1] Mills, (a), pp. 12, 20, 23, 25.
[2] Mills, (b), pp. 8, 13, 28.

eighty per cent of the bird bones, trumpeter swan, wild goose, great horned owl, bald eagle, bittern, fish, box turtle, and mussel.

That fish were used for food here in Kentucky is also suggested by the fish hooks made of bone which were frequently found (p. 187, Plate XXI, Figs. 11–13) and by the impressions of netting on pottery (Plate XXI, Fig. 15). Bones and scales of fish were found by Mills in the refuse pits in the Gartner site.[1] We dug up shells of several species of fresh water clams (Plate XIX, Figs. 4, 5). Mussels were apparently much used for food by the prehistoric people of the Gartner village site,[2] and beds of them, probably kitchen refuse, like little shell heaps, were found in the cache holes, used as refuse pits.

The charred remains of corn and corn cobs, beans, hickory nuts, and walnuts (Plate XIX, Figs. 6–10), were also secured on the Fox Farm. The corn cobs were small but bore eight and twelve rows of corn while at the Baum site Mills found cobs of eight and ten rows.[3] Some pottery bearing impressions such as probably could be made with the large end of a peach pit (Plate LV, Fig. 11) was found here. Mr. H. P. Gould, pomologist in charge of fruit district investigations, of the United States Department of Agriculture informs me that the Department has no historical evidence indicating the existence of the peach in Kentucky in pre-Columbian times, in fact that the species *Prunus persica* to which the peach belongs is not indigenous to this country and, so far as he is aware, all of the closely related species to which the apricots, almonds, etc., belong are also introduced species and were brought to this country, so far as we have any information, in comparatively recent times. He also states that none of the plums they know anything about have large rough pits and in fact, that the native plums, which alone of the plum family could have figured in the pre-white occupation of Kentucky, must have possessed relatively small and comparatively smooth pits as judged by the characteristics of the native plums of the present time. He states that if there was anything in the way of a plum having a large rough pit which could have been used to make the markings on this pottery, it must have been something now lost and unknown even historically, so far as the horticultural varieties and types of plums are concerned. It thus seems that the markings were either not made with a peach pit or that the pottery was made since the discovery of America and the introduction of the peach, but in this case it seems strange that no other evidences of white contact were found. In the Gartner village site, corn on the cob, shelled corn, beans, hickory nuts of three kinds, and wal-

[1] Mills, (b), p. 50.
[2] Mills, (b), pp. 29–30.
[3] Mills, (c), p. 34.

nuts were found in a charred state[1] but there chestnuts and seeds of the pawpaw, butternuts, hazel nuts, and the seeds of the wild plum all in a charred condition were also found.

Materials for Manufacture, Minerals, Stone, Metals, and Clay. For raw material to make tools and other objects, they depended upon stone, clay, bone, antler, teeth, shell, and plant substances. Chert, chalcedony, and jasper were used for chipped points to arrows, spears, knives, drills, and scrapers, as shown by objects made of those materials. Jasper was also chipped into celts (Plate XXXI, Fig. 9). Limestone was chipped into discs (Plate XXII, Fig. 2), pecked into pitted stones (Plates XXXII, Fig. 7), and made into whetstones (Plate XXXIII, Fig. 1), arrow-shaft smoothers (Plate XXXIII, Fig. 5) and pipes (Plate XLVI, Fig. 7). Sandstone was made into whetstones, arrow-shaft smoothers (Plate XXXIII, Figs. 3 and 6), discs, perforated discs (Plate XLIV, Figs. 1–6, and 8–18), and pipes (Plate XLV, Figs. 1–3). Slate furnished the material for perforated tablets or gorgets (Plate L, Fig. 1), and for a surface on which to incise pictures (Plate LII, Fig. 8). Pebbles of quartz and other material were made into hammerstones (Plate XXXII, Figs. 1–5), and pecked and ground into celts (Plate XXXI). No gold, silver, copper, iron, galena, or objects made of any of these materials were found although in the Baum site of the same material culture copper was found.[2] We found no mica here as Mills did at the Adena Mound and the Gartner site of Ohio.[3]

Clay was used for making pottery which was fashioned into vessels, strainers (Plate XXIII, Figs. 3–4), spoons (Plate LI, Fig. 4), pipes (Plate XLV, Fig. 11), discs (Plate XLIII, Figs. 9, 10), perforated discs (Plate XLIII, Fig. 11), beads (Plate XLVIII, Fig. 1), and various modeled forms on the edges of the vessels (Plate LIV, Figs. 3–5).

Bone. The bone, antler, and teeth of animals were used as material out of which to make various objects, and their skins no doubt were employed in making garments and other useful things. The following species were represented by the remains found: the black bear (Plate XVII, Fig. 1), Virginia deer (Plate XVII, Fig. 2), elk (Plate XVII, Fig. 3), wolf, raccoon (Plate XVII, Fig. 4), red fox (Plate XVII, Fig. 5), lynx or wild cat (Plate XVIII, Fig. 6), opossum (Plate XVIII, Fig. 7), woodchuck (Plate XVIII, Fig. 8), beaver (Plate XVIII, Fig. 9), red or fox squirrel (Plate XVIII, Fig. 10), pack or wood rat (Plate XVIII, Fig. 11), mink (Plate XVIII, Fig. 12), weasel (Plate XVIII, Fig. 13), great blue heron (Plate XVIII, Fig. 1), wild turkey (Plate XVIII, Fig. 2), duck (Plate XVIII, Fig. 3), owl

[1] Mills, (b), pp. 26, 33, 34, 53.
[2] Mills, (c), p. 21.
[3] Mills, (a), p. 11; (b), p. 65.

(Plate XVIII, Fig. 4), eagle (Plate XVIII, Fig. 5), two species of turtles (Plate XIX, Figs. 1, 2), and fish (Plate XIX, Fig. 3). The metacarpus and the metatarsus of the deer were made into skin scrapers (Plate XXXIV, Fig. 2), and awl-like implements (Plate XXXIV, Figs. 12–14). Part of the metacarpal bone of the deer was found by Mills in the Adena Mound of Ohio.[1] Large thick bones furnished the material for cylinders and needles (Plate XXXIV, Fig. 17). The ulnae of the elk, deer, bear, and other animals were used to make awl-like implements (Plate XXXV). The tarsometatarsus (Plate XXXIV, Figs. 3, 4), and tibio-tarsus (Plate XXXIV, Fig. 5) of the wild turkey were also frequently used for this purpose. Pieces of bone were made into chisel-like objects (Plate XXXIII, Fig. 7). Artifacts were made out of the penis bone of the raccoon (Plate XLII, Figs. 4, 5, and Plate LI, Figs. 10, 11). Bone furnished the material for fish hooks (Plate XXI, Figs. 11–13, and Plate XXXIX, Figs. 1–10), and a number of objects of unknown use. Phalanx bones of elk and deer were cut at the large end and perforated through the opposite articular surface for use in a game similar to "ring and pin," or as pendants on clothing (Plate XLIII, Figs. 4–7). The astragalus bone of the deer (Plate XLIII, Fig. 8) was frequently found and may have been used in gambling or as a buzz. Hollow light bones of birds were made into fifes or whistles (Plate LI, Figs. 13–14), perhaps sometimes used as animal calls. Some of them and a few small bones of other animals were cut off in sections for making tubes (Plate XXI, Figs. 8–10), and beads (Plate XLVIII, Fig. 2). Fragments of turtle shell were also found in which a perforation had been made (Plate XXXVII, Fig. 10).

The claw core, or terminal phalanx of an eagle was incised (Plate XVIII, Fig. 5).

Antler. The tips of antlers were made into arrow points (Plate XXI, Figs. 1–5). Antler was used for making cylinders, both long and short (Plate XLIII, Figs 1, 2, and Plate XXXIII, Figs. 8–10), and a species of celt-like objects (Plate XXXI, Fig. 10, and Plate XXXIX, Figs. 11–14). Some large pieces of antler were perforated at one end (Plate XXXVII, Fig. 11).

Teeth. Bear teeth were made into pendants both by perforating through the tip of the root, and by grooving around it (Plate XLIX, Figs. 15–18). Teeth of the elk, deer (Plate XLIX, Fig. 10) and wolf (Plate XLIX, Fig. 11) were also made into pendants by perforation. Beaver teeth were cut off at the back and across the root for use as knives (Plate XXXIII, Figs. 11–14). Bear teeth were cut off at the end of the enamel, for some, at present, unknown purpose (Plate LI, Figs. 7, 8).

[1] Mills, (a), p. 10.

Shell. The shell of several species of fresh water clams furnished the material for spoons or scrapers (Plate XXII, Fig. 6), some of which were perforated through the dome (Plate XXII, Fig. 5). Pounded up, they were used in tempering pottery (Plate XXIV, Fig. 1). Shells, at least of *Olivella*, *Busycon*, and *Marginella apicina* from the Atlantic or Gulf Coasts, secured either from neighboring tribes by barter or warfare or by expeditions to the sea were found to have been made into beads (Plate XLVIII, Figs. 12–18), pendants (Plate XLIX, Figs. 30–35), discs, perforated discs (Plate L, Figs. 8–14), and pins (Plate L, Fig. 16). Small ocean shells were found in the Adena Mound[1] and pieces of ocean shells in the Gartner Mound.[2]

Plant Materials. The use of plant material, other than for food which has been mentioned, and for fuel as indicated by finds of charcoal and wood ashes, is indicated by the impressions of cord (Plate XXIV, Fig. 6, and Plate XXV, Fig. 3) and netting (Plate XXI, Fig. 15, and Plate XV, Figs. 1, 2), upon the outer surface of pottery. Implements for the gathering of the vegetable fiber used, were not recognized as such, if found.

Securing Food.

Hunting, Fishing, Gathering Wild Plant Products, and Agriculture. The implements used in procuring food in this region, as far as illustrated among our finds, were those used in hunting and fishing, such as points chipped from stone or rubbed out of antler, fish hooks of bone, and nets. No objects known to have been used for gathering wild plant foods were found, although it is true that walnuts and hickory nuts in a charred condition were secured. Nor were there any objects known to have served for agricultural implements, in spite of the fact that charred specimens of corn cobs, corn, and beans were not infrequently met with in our excavations, and that the chipped limestone discs (Plate XXII, Fig. 2), and oblongs (Plate XXII, Fig. 4), and the chipped celts (Plate XXXI, Fig. 9), may have been hoes or digging stick points for agricultural work. However, none of these objects, which may possibly have been used in digging and hoeing, bear signs of polished edges caused by use in cultivating the soil. It will be remembered that the large agricultural implements from Illinois, Arkansas, and the adjacent country are often highly polished on the edge from use in contact with sandy soil. Possibly all agricultural work and digging was accomplished in this region with digging sticks. Of course,

[1] Mills, (a), p. 20.
[2] Mills, (b), p. 14.

many of the points for spears, arrows, and knives, may have been used in warfare as well as for hunting and some of them in various industries or for any of these purposes. The celts pecked and ground out of stone (Plate XXXI, Figs. 1–8), those chipped out of jasper (Plate XXXI, Fig. 9), and those made of antler (Plate XXXI, Fig. 10), the discs (Plate XXII, Fig. 2), and oblongs (Plate XXII, Fig. 4) chipped from limestone, chipped pebbles (Plate XXXII, Fig. 1), and hammerstones (Plate XXXII, Fig. 4), some or all of each class may have served occasionally for or solely as axes or club heads used in hunting or warfare. No grooved club heads or axes were found here (p. 195).

Some of the objects considered as awls may have served as daggers or even as spear points (Plate XXXII, Fig. 14); large pieces of antler as clubs used in hunting or in war. Large pieces of antler perforated at one end (Plate XXXVII, Fig. 11), may have been used as slung shots.

Points chipped out of Stone. For hunting, points for arrows, spears, and knives, chipped out of chert, chalcedony, quartzite and jasper were found. No points ground out of stone were seen, although points for arrows made by rubbing and drilling the tips of antler were frequent.

The various styles of chipped points are shown in Plate XX. It will be noticed that some of these (Figs. 9 and 10) have serrated edges and that the chipping is neither of the most crude nor of the most excellent workmanship found in the Mississippi Valley. The edges of the base and notches of some were rubbed smooth as if from friction on the lashings that held them to their shafts (Plate XX, Figs. 11, 12). Arrow points and a spear point of reddish brown flint were found in the Gartner Mound, triangular arrow points chipped from stone were common at the village site there [1] and a spear head of chalcedony was found in the Adena Mound.[2] No caches of these chipped implements or for that matter of any other class of objects, were found here in Kentucky.

Manufacture of Points chipped out of Stone. The extensive manufacture of chipped points apparently did not take place at this site, although a few chips and flakes as well as very roughly chipped pieces of stone, such as might well be termed rejects, were collected and the method of manufacture is somewhat illustrated by a series of specimens which may be selected from the objects found on the farm (Plate XXXVIII, Figs. 1–7). Although, as previously mentioned, it does not seem probable that many chipped points were made here, yet fragments of stone were found which when fresh from the quarry and consequently still containing their quarry

[1] Mills, (b), pp. 15, 20, 37.
[2] Mills, (a), p. 17.

water would have been suitable raw material (Plate XXXVIII, Fig. 1). The hammerstones (Plate XXXVIII, Fig. 2; Plate XXXII; and p. 196), were probably used for breaking these pieces into suitable form and roughly chipping them. Chips, the refuse from this process, were also found (Plate XXXVIII, Fig. 3). The points roughly chipped into form, but not finished and then lost or rejected because of some fault in the material or accident in chipping, were also found as shown in Plate XXXVIII, Fig. 4. The fine flaking which completed the work was probably done with a flaker made of bone or antler which may have been buried in ashes or otherwise treated so as to remove the greasy animal matter and make it less liable to slip in the process. The bone and antler cylinders (Plate LI, Fig. 15; Plate XXXVIII, Fig. 5; Plate XXXIII, Fig. 9; Plate XLIII, Figs. 1, 2; p. 198) may have been used as flakers. The fine flakes made by this process with those or similar flakers were also found (Plate XXXVIII, Fig. 6). The finished points (Plate XXXVIII, Fig. 7; Plate XX) complete the series.

Points rubbed out of Antler. Points for arrows made from the tips of antler were comparatively numerous. Typical specimens of these are shown in Plate XXI, Figs. 1–5. They were probably for use on arrows, or possibly on spears. Arrows with similar points collected in the eighteenth and first part of the nineteenth century, supposedly from the Indians of Southeastern United States, have been described by Mr. Charles C. Willoughby,[1] who states that they were used from Maine to Arkansas. Such points were found in the Adena Mound[2] and were more common than points chipped from stone in the Gartner village site.[3] These are further discussed under the consideration of fish spears. Points somewhat similar to these but made of phalanx bones of the deer are common in the Gartner village site.[4] The spatulate objects shown in Plate LI, Fig. 16, and the points apparently broken from similar objects shown in Plate XXI, Figs. 5, 6, were possibly used as spear points.

Manufacture of Points rubbed out of Antler. The manufacture of points rubbed out of antler is also suggested by specimens found[5] (Plate XXXVIII, Figs. 8–21). Prongs (Plate XXXVIII, Fig. 8), broken from antlers were quite common. Some of the prongs broken off had been cut around or part way around (Plate XXXVIII, Figs. 10, 11) apparently with a flake of stone (Plate XXXVIII, Fig. 9), in order that the tip out of which to make an arrow point might be readily broken off. Pieces, from each of

[1] Willoughby, pp. 431–437; Cf. Skinner, pp. 14, 21.
[2] Mills, (a), p. 27.
[3] Mills, (b), p. 41.
[4] Mills, (b), p. 41.
[5] Cf. Willoughby.

which a tip had been removed by grooving and breaking, were numerous. They were irregularly broken off from the antler at their large end and show signs of the groove around their smaller end where the tip had been broken off after being cut around. Such pieces (lower part of Fig. 12, Plate XXXVIII) were naturally more numerous than the tips broken from them; but tips (upper part of Fig. 12, Plate XXXVIII) were also found and showed at their bases where they had been cut around and broken off. Some were found not yet sharpened, but drilled at the base (Plate XXXVIII, Fig. 17) for the shaft of an arrow or spear, apparently with a chipped drill point such as is shown in Plate XXXVIII, Fig. 16. More of them, however, had been whittled with a stone flake (Plate XXXVIII, Fig. 9) and sharpened or smoothed (Plate XXXVIII, Fig. 15) apparently upon a coarse piece of sandstone (Plate XXXVIII, Fig. 14). Still others (Plate XXXVIII, Figs. 17, 18), the greater number of the tips found, had been completed by both sharpening and drilling. Sometimes the prong was sharpened before being grooved for breaking. The finished point at one side was somewhat longer than at the other and this side of the base being slightly pointed served as a barb (Plate XXXVIII, Fig. 18; Plate XXI, Figs. 1–5). At the Gartner village site every stage of manufacture was represented, even caches of the antler tips were found. There, these were drilled after breaking from the grooved prong and before any other work was done on them. The surplus antler was removed by cutting with a piece of stone.[1] Mills notes concave facets and striations as being proof that the cutting was not done with a steel knife. The final work on the points found at the Gartner village site was done by rubbing them on a fine-grained sandstone.

Snares, Bolas, Calls, and Charms. Some of the bone tubes (Plate XXI, Figs. 8–10), especially those with edges worn smooth, may have been parts of snares and some of the cut and perforated phalanx bones (Plate XLIII, Figs. 4–7) mentioned, may possibly but not probably have been for little bolas. The hollow light bird bones and the few small mammal bones cut off at the ends and drilled (Plates LI, Figs. 13–14) may have been used as animal calls in hunting. It is possible that some of the perforated discs made of sandstone (Plate XLIV, and Plate L, Fig. 2), pottery (Plate XLIII, Fig. 11), and shell (Plate L, Figs. 8, 9), the perforated shells (Plate XLVIII, Figs. 12–24, and Plate XLIX, Figs. 19–33), some of the objects considered as pendants (Plate XLIX, Figs. 19–35), the perforated and knobbed teeth (Plate XLIX, Figs. 10–11, and 15–18), and the drilled phalanx bones (Plate XLIII, Figs. 4–7) of the elk and deer may have been fastened to weapons as charms.

[1] Mills, (b), p. 41; (c), p. 51.

Fish Spears. The points made of antler tips described as arrow points, and in fact some of the chipped stone points may have been used as fish spears. Points made up of three pieces of bone of a form suggesting these antler tips were extensively used on salmon spears on the Northwest Coast of America, where, however, they were detached by the struggles of the fish but were held by lashings to a retaining cord attached to the spear-shaft.[1] Double pointed objects made of the heavy leg bone of an elk or similar animal considered by Mills as awls or spear points were found in the Gartner site.[2]

Fish Hooks. Fish hooks (Plate XXI, Figs. 11–13) made of bone were used. Some of the hooks (Plate XXXIX, Fig. 8) have a little knob at the tip and others (Plate XXXIX, Fig. 9) have incisions around them. Apparently these knobs and incisions were made to facilitate attachment to the fish line. Fish hooks made of bone were found in the Gartner Mound;[3] and less than twelve whole and more than twenty broken, some grooved for the attachment of a line, in the adjacent site. They compare favorably with those found at the Baum village site.[4] One method of manufacture of such fish hooks was described many years ago by Prof. Frederick W. Putnam in his paper entitled, "The Way Bone Fishhooks were made in the Little Miami Valley."[5] The methods of manufacture of these hooks, however, are somewhat different and are partly illustrated among the finds (Plate XXXIX, Figs. 1–10).

Several specimens of what appear to be the humerii of turkeys were found (Plate XXXIX, Fig. 1) out of one side of each of which a somewhat rectangular oblong piece had been cut (Plate XXXIX, Figs. 3, 4). Pieces of such thin bone of the size and shape of the above-mentioned pieces were occasionally found (Plate XXXIX, Fig. 5); sometimes these were drilled at each end (Plate XXXIX, Fig. 7) in order to facilitate cutting out the middle portion and making each end the shape of a hook. Some of the fish hooks, by having the general curve and thickness of such a bone, show that they have been cut out of such, and others not completely finished, show the remains of the perforations (Plate XXXIX, Fig. 8). The second method is illustrated by still other fish hooks which show that they were made from the outer surface of a hollow cylindrical bone (Plate XXXIX, Figs. 5–9) apparently by slicing rather than by drilling. One piece of bone or antler (Plate XXXIX, Fig. 10) is rounded at the end, has a scraped groove with a

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[1] Smith, (d), pp. 309, 335, 374, Fig. 160, p 388; Swan, Fig. 4, p. 20; Smith, (c), Fig. 15, p. 148; Teit, Fig. 231, p. 251.

[2] Mills, (b), p. 48.

[3] Mills, (b), pp. 8, 50; (c), p. 70.

[4] Mills, (b), p. 52.

[5] Putnam, (a), p. 581.

drilled hole in the middle near that end. It is possibly in process of manufacture into a fish hook. Pieces of bone in every stage of manufacture into fish hooks were found in the cremation ashes of the Gartner mound and the village site.[1] The process[2] although somewhat similar was different from the two used here on the Fox Farm. There the central part of an oblong piece of bone was dug out instead of being removed by drilling or by slicing off part of a cylindrical bone.

Some of the bone objects considered as awls (Plate XXXIV, Figs. 9–11), among them especially the sharpened splints (Plate XXI, Fig. 14) from deer leg bones may have been used as hooks or barbs for hooks for fishing, and objects considered as pendants such as the perforated bear teeth (Plate XLIX, Figs. 15–18), shiny shells (Plate XLVIII, Fig. 18), and the shell object shown in Plate L, Fig. 6, may have served for artificial fish bait, possibly on trolling lines.

Nets. Fish were probably caught in nets as is suggested by the impression of netting on fragments of pottery (Plate XXI, Fig. 15), although the mesh of the netting here impressed is very small. The fragment of a bone object (Plate LIII, Fig. 4) considered as possibly a scraper may have been a mesh measure. Pebbles notched or grooved on two edges and without battered ends and considered by Mills to be net sinkers were found at the Gartner village site.[3]

Gathering Plant Food. Celts, pecked and ground out of stone (Plate XXXI, Figs. 1–8), those chipped out of jasper (Plate XXXI, Fig. 9), and those made of antler (Plate XXXI, Fig. 10), and the discs (Plate XXII, Fig. 2) and oblongs (Plate XXII, Fig. 4) chipped out of limestone, or some of each class may have served occasionally or solely as hoes for agricultural work or with the sharp bone objects (Plate XXXIII, Fig. 7), in the securing of bark, or other plant foods or some of them. Pieces of slate with notches or grooves on the sides were frequently found in the Gartner village site[4] and are considered by Mills to be agricultural implements. Hoes, each made of a thick heavy mussel shell (*Unio plicatus*) with a perforation are common in the Gartner and Baum village sites,[5] and were found by him in the Adena Mound[6] but the few specimens found by us (Plate XXII, Fig. 5) are somewhat different from such common shell hoes as I have seen in Ohio and apparently were not used as hoes.

[1] Mills, (b), pp. 8, 50.
[2] Mills, (b), Fig. 53.
[3] Mills, (b), p. 40.
[4] Mills, (b), p. 40.
[5] Mills, (b), p. 40; (c), p. 50.
[6] Mills, (a), p. 12.

Preparation of Food.

Knives. Suitably mounted chipped stone points (Plate XXII, Fig. 1) may have been used as knives for cutting up meat and for similar purposes. Discs chipped from limestone (Plate XXII, Fig. 2), of which many were found, a few oblongs also chipped from limestone (Plate XXII, Fig. 4), and pebbles with chipped edges, if not agricultural implements or skin scrapers were perhaps used in like manner. One rather thick specimen somewhat chipped on the thin edge (Plate XXII, Fig. 3), suggests a chopping knife, and may have been used as such. It reminds one of the fish knives made of slate which are used by the Indians of the Northwest Coast and by the Eskimo. The unio, or fresh water clam, of which a number of shells were found having one edge sharpened (Plate XXII, Fig. 6) may have been used as knives. What Mills considers to be knives made of the shoulder blade of the deer and elk or of the posterior portion of the metapodial bone of the deer were found in the Gartner site.[1]

Pestles and Mortars. No pestles or mortars were seen by us, although it is known that they were frequently found in the region, pestles being common in every part of the Gartner village site and mortars made of large slabs of sandstone being found there.[2]

Cooking. Meat was probably roasted before open fires. Charcoal (Plate XXIII, Fig. 1) and ashes were frequently found. There must have been another method of preparing meat as is indicated by the great number of potsherds (Plates XXIV–XXX and Plates LIV–LIX) found, most of which seem to be parts of broken cooking dishes rather than of ceremonial or water jars. Many of these fragments of pottery have soot (Plate XXIII, Fig. 2) on the outer surface which suggests that cooking was done in pottery vessels over open fires. The little clay dishes shown in Plate LI, Fig. 5, are possibly toy cooking pots used by the children. Fragments of pottery vessels the size of a thimble were found in the Gartner village site.[3] Some stones covered with soot, others cracked and appearing like stones that have been heated and dropped in water, were found in excavating. These remind us that boiling may have been done in pottery vessels or even in baskets or boxes by adding hot stones. However, they are probably the stones used as pot props or the results of baking roots or vegetables covered with leaves by building a fire on top of them. This process, of course, burns the pebbles nearby.

[1] Mills, (b), p. 49.
[2] Mills, (b), p. 34.
[3] Mills, (b), p. 35.

Pottery. One whole bowl of pottery and many fragments were found. Most of the ware was of a brownish color but a few pieces were coated with a reddish layer which is thicker on the outside. A very few pieces were polished. Pottery was found by Mills in the Adena Mound [1] and was common in the Gartner site.[2] A pottery jar was found in the Gartner Mound.[3]

Manufacture of Pottery. The manufacture of pottery is somewhat illustrated by the specimens shown in Plates XXIV–XXX. The clay was probably obtained in the neighborhood. For tempering material, fragments of shell were used. The piece of pottery shown in Plate XXIV, Fig. 1, has been split and exhibits the fragments of shell used in tempering it. The particles of stone found in the pottery were apparently accidentally taken up with the clay and not added as tempering material. The little ball of burned clay or pottery showing finger nail impressions, illustrated in Plate XV, Fig. 2, may be a bit of the raw material for pottery-making which was accidentally or purposely fired. Pottery found in the Gartner village site [4] was tempered with crushed shells, quartz, quartzite, and pebbles. Clay mixed with broken quartz pebbles and broken shell ready to be made into pottery was sometimes found in a niche in a grave near the head of the skeleton in the Gartner Mound [5] where in several instances a large mussel shell and sometimes an awl, in others, small river pebbles varying in diameter from two to three inches, were found with the clay. The next specimen shows how some of the ware was cracked in firing, but most of it, as may be seen (Plate XXIV, Fig. 2) by a reference to the other specimens, was more successfully fired. Fragments of charcoal (Plate XXIII, Fig. 1) were frequently found. Some of these may be the results of fires used in firing the pottery. Burned patches of ground were also discovered which may have been the sites of this process. That the pottery was fired in more or less open fires is suggested by the mottled or irregularly burned surface of the ware. The quality of the ware varied somewhat from that of a rather fine surface to some of rough finish (Plate XXIV, Fig. 3).

Many of the fragments found are portions of rims. The specimen shown in Plate XXIV, Fig. 4, illustrates such a rim with a punched perforation probably made to facilitate suspending the pot. The perforation in the next specimen, also a fragment of a rim, was drilled while the perforation through which the following fragment was broken is larger and was apparently modeled.

[1] Mills, (a), p. 11.
[2] Mills, (b), p. 34.
[3] Mills, (b), p. 10.
[4] Mills, (b), p. 35.
[5] Mills, (b), p. 10.

Traces of the method of shaping pottery are shown in the specimens illustrated in Plate xxv. The first bears impressions of fine netting which was perhaps wound on a paddle used in patting the outer surface of the vessel. This may have been done to shape the pot or to roughen the outer surface. The next shows the impression of a somewhat coarser netting and the size of the mesh and knots may be clearly seen. There seems to be no lapping of impressions on this fragment which suggests that perhaps they were made by the net used in lifting or holding together the unfired vessel, instead of by a paddle wound with the netting. Fig. 3 of this plate shows the impressions of twisted cord where they lap and run at different angles showing that they were made by a cord-wrapped paddle. According to Mills, cord-wrapped paddles were used at the Gartner village site.[1] In Fig. 4 of the same plate, the impressions of cord have been partly smoothed down before the vessel was fired. The next fragment shows lines, apparently modeled on the clay to represent cord markings; while Fig. 6 of this plate shows the impressions of a carved paddle, probably made of wood.

The method of attaching the loop handles to the pots is illustrated by some of the specimens found. Apparently the handle was modeled separately from the pot and had a knob or projection on the upper end to be inserted in a depression made in the vessel near or at the rim. The handle was then attached by smearing or modeling the clay of both ends to the vessel. At the Gartner site practically all the larger vessels had handles, modeled and put in place after the vessels were formed.[2] Mills states that these were attached by piercing the vessel and inserting a small plug of clay which was expanded on the inside. On the outside, the handle was molded to this plug. The fragment of a pot rim shown in the next figure shows how the upper edge of the vessel was sometimes folded over to form the rim. This specimen also bears a small knob or lug. The next figure illustrates a small piece of rim bearing a little lug, the middle of which is concave. Such lugs were not frequently found. The next specimen bears a lug made up of two horizontal ridges.

Handles of various forms are shown in the remainder of the plates (Plates xxvi–xxx). All these handles may be considered to be developments of two knobs or nipples as shown in the first figure. About a third of them appear to have been developed by the union of the lower parts of these knobs as in the second figure. A specialization or more intense development of this type of handle is shown on the other fragments of rims on this plate, and attempts at decoration may be noticed in Figs. 5, 8 of

[1] Mills, (b), p. 35.
[2] Mills, (b), p. 35.

the same plate where the notches made with the tip of the finger and showing the imprint of the finger nail also have been made on the top of the ridge. In lifting a vessel provided with such lugs as these it would seem that the thumb would be placed above the lug and the fingers would lift on its lower side.

Perhaps another third of the handles were developed from a union of the upper part of two knobs or projections on the rims of the pots as illustrated in Plate XXVII. The first specimen shows two knobs somewhat elongated vertically. In the second, the rim is slightly enlarged and tends to connect the upper parts of the knobs, while in the third and fourth there is a perceptible ridge in line with the rim and connecting the two parts of the lug. The remaining specimens shown in this plate illustrate the range of forms and specialization of handles of this type. This form of handle was found at the Gartner village site.[1] In lifting vessels bearing this type of handle it would seem that the forefinger might rest in the concavity below the bridge over the top of the lugs or that the fingers might find gripping places below the entire lug. The form of the last specimen may possibly be interpreted as a crude representation of an animal.

A variety of handles is shown in Plate XXVIII. The first and second may be considered to be an extreme development of the type of handle shown in Plate XXVI, where the lower part of the lug is hardly below a level with the lower part of the rim. If this type of lug is still further developed it becomes a horizontal ear like that on the fragment of rim shown in Plate XXVIII, Fig. 3. In this case, the lug is slightly below the top of the rim, while in the next figure it is level with the rim and seems to be decorated with a little knob on the top. Specialized lugs of this type are shown in the remaining figures on this plate. One represented by Fig. 5 has an incision down its middle, while the one shown in Fig. 6 has a vertical incision near each end. Fig. 7 shows such a lug with several incisions. If we consider that such a lug, as for instance the one shown in Fig. 8, is still further developed by being elongated and attached to the vessel lower down, we have as a result the type of loop lug or handle shown in Plates XXIX and XXX.

More than a third of all the pottery handles found are of this loop form. The method of attaching this type of lug has been discussed on p. 191. They vary in size and somewhat in shape as shown in the plates. The first is nearly a straight band and meets the rim of the body of the jar with a rather acute angle while in the second the lug is more cylindrical in form and is rounded out so that it forms almost a semi-circle, to which the body of the

[1] Cf. Mills, (b), Fig. 29a.

jar would be a diameter. Fig. 3 of the same plate shows a lug which is much wider at the top than at the bottom and the rim is marked by transverse incised lines or notches. While the rim above the lug in the last figure in this plate may be considered as developed from such notches it shows large even smooth scallops. The lugs shown in Plate XXX show considerable specialization. The first bears a series of dots, apparently for decorative purposes. The second, has an unusually protruding rim at each side of the top of the lug. The fifth shows a lug of this character, but one having practically no opening between it and the body of the jar. The sixth bears rows of impressions apparently for decorative purposes, while the seventh not only has two nipples on the rim, one on each end of the top of the lug, but is also depressed longitudinally down its middle in such a way that it slightly resembles the lug shown in Plate XXVII, Fig. 8.

Before the pottery was fired the rims and handles were often ornamented and designs were incised upon the pottery apparently for decorative purposes. These incisions were possibly made with some of the bone implements such as those described on p. 201 and shown in Plate XXXIV, Figs. 3–15, and Plate XXXV. One piece of pottery was painted (Plate LIV, Fig. 11). The modeling, incising, and painting of pottery are mentioned under the section of art.

Strainers. Fragments of strainers made of pottery were found. In some of these (Plate XXIII, Fig. 3) the perforations have been made by punching from the inside before the vessel was fired; in other cases (Plate XXIII, Fig. 4) the holes have been drilled from without after sun drying or firing. It will be remembered that both punched and drilled perforated pottery strainers are found in the cliff-dwellings of the Southwest and that the holes are sometimes arranged in designs such as circles and crosses.

Spoons. Spoons are suggested by the number of fresh water clam shells found to be somewhat rubbed across the edge opposite the hinge apparently by scraping against the bottom and sides of rough pottery dishes. I have seen modern Indians at Victoria, British Columbia, using clam shells in this way. The pottery object shown in Plate LI, Fig. 4, may be a spoon or ladle.

Forks. Some of the objects considered as awls (Plate XXXIV, Figs. 3–7, and Plate XXXV) may have served as forks. Mills also considers that the awls made of the tarsometatarsus of the wild turkey as well as the "effigy" awl carved to represent the head of a fox or some closely allied animal, and large awls made of bone found in the Gartner village site served for forks as well as awls.[1]

[1] Mills, (b), p. 47.

Succotash. Charred masses of a mixture of corn and beans were often found and this suggests that these two foods may have been prepared as succotash (Plate XIX, Figs. 6, 8).

Habitations.

No remains of habitations were discovered. The several oblong or rectangular depressions mentioned on p. 177 were natural sink holes, the results of the caving of the earth above caverns formed by the solution of the limestone below. The village refuse in and near them was much less plentiful than in other places. It seems altogether likely that the habitations used by these people were such as to leave no very marked depressions or signs other than the great abundance of village refuse in certain places as compared with the usual amount which was found scattered about the surface of the farm. It is true that in several places this refuse was collected to form the mounds which I did not consider the remains of habitations, but rather simple coverings to a number of graves.

Caches. Caches of implements [1] roughly chipped from chalcedony and jasper were numerous in the Gartner village site and caches of antler tips [2] were also found there. It seems probably accidental that we found no such caches here.

Mats. Mats for shelters and beds, floor mats, and food mats were perhaps made by weaving or sewing together cat tail stalks or tulies, although no long needles suitable for sewing such material were found. It is quite possible, however, that needles were made of wood and long since disintegrated or that some of the awls were used for that purpose, the thread or twisted cord such as is shown by the impressions on the pottery, being pushed through by the fingers.

Tools used by Men.

A number of artifacts considered to be tools were found. Among these, celts, hammerstones, whetstones, arrow-shaft smoothers made of stone, chisel-like bone objects, antler pins, and cylinders, beaver-tooth knives, chipped knives, flakes, and drill points are considered as having probably been used by men.

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[1] Mills, (b), p. 39.
[2] Mills, (b), p. 42.

Celts made of Stone. Stone celts were occasionally found. The forms of these are shown on Plate XXXI, Figs. 1–9. All were of the general types common to the Mississippi Valley. The celts shown in Plate XXXI, Figs. 2, and 5–7 are broader at the edge than at the poll. The side edges and poll of some of these tend to be more or less flat. The surfaces of the sides and the outline of the cutting edge are convex. Some (Plate XXXI, Figs. 1–3, 7–8) are symmetrical, that is, sharpened about equally from each side; others (Plate XXXI, Figs. 4–6) are sharpened from one side more than from the other. A few (Plate XXXI, Figs. 5–6) seem to have slight notches in the side edges, possibly made to facilitate hafting or caused by hafting them. Most of the celts were made of tough granular stone, were pecked into shape and then polished. A few were chipped (Plate XXXI, Fig. 8) before being pecked. The polishing was not sufficient in some cases to obscure the marks of pecking (Plate XXXI, Figs. 2, 8). Some of the celts, however, were made of jasper and chipped into form. One of these shown in Plate XXXI, Fig. 9, is double edged or double bitted and has a more or less straight asymmetrical cutting edge. Part of the lower cutting edge has been formed by grinding and polishing and the side edges are rubbed smooth. Those celts formed by chipping and grinding are much more scarce than those formed by pecking and polishing, not only on this farm, but if not in the whole Mississippi Valley, at least in the greater part of it. One of the double bitted ground celts made of yellowish sandstone is very small and may be a whetstone instead of a celt. An object described on p. 197 as having been used as a hammerstone was no doubt first a celt made by pecking and polishing. It appears to have been a symmetrical celt. Celts made of stone were found in the earth of the Gartner Mound and in every part of the Gartner village site. One found in a grave was finely polished. Although none were grooved, many were pecked for the attachment of a handle.[1] According to Mills, they were found there in all stages of manufacture. In some cases pecking had been begun only on a small surface of a pebble of suitable form, in others it had been completed. The same was true of the subsequent grinding. No grooved axes were found by us on this Kentucky site and Mills found only two at the Baum site.[2]

Some of the thin oblong pieces of limestone chipped on the edges (Plate XXII, Fig. 4), and in fact, the numerous flat discs of limestone, roughly chipped to a cutting edge around their entire circumference (Plate XXII, Fig. 2) may have been used as celts, but they show no polished or worn edges.

[1] Mills, (b), pp. 13, 39, 62.
[2] Mills, (c), p. 42.

Celts made of Antler. Celts made of a slab of antler and asymmetrical, being sharpened rather more from the inner side than from the natural surface (Plate XXXI, Fig. 10), were found. They are broader towards the cutting edge than at the poll.

Manufacture of Celts made of Antler. The history of the manufacture of these celts is suggested by a number of specimens, several pieces of antler (Plate XXXIX, Fig. 12) were found which had been cut along the sides in such a way as to form a V-shaped groove which was apparently made with some such object as a stone flake (Plate XXXIX, Fig. 11) or a chipped stone point and for the purpose of working through the stronger outer part of the antler so that a slab or section might be broken out. These sections lying between such grooves compare approximately in size to the celts made of antler and if broken out carefully would furnish material for their manufacture. These slabs might then be rubbed into shape and sharpened to an edge on a piece of sandstone (Plate XXXIX, Fig. 13). This work might obscure all signs of the grooving (Plate XXXIX, Fig. 14); but the celt shown in Plate XXXI, Fig. 10, has grooves on each side edge apparently by means of which it was cut out. Large celts made of elk antler were found at the Gartner village site.[1] Mills also mentions scrapers in a way indicating this class of objects. He states that few "scrapers" made from the antler of the elk were found in various parts of the site; some were sharpened at both ends and these were longer than those sharpened only at one end which latter were probably provided with a handle. A few of these have notches cut on the side edges.[2] No notched celts were found by us on the Fox Farm. Scrapers made from the heavy metapodial of the elk were found in the Gartner village site.[3] According to Mills, they were made like the scrapers of antler and were probably hafted in wooden handles (p. 198).

Hafting and Use. These various celts were probably hafted and used in carpenter work as axes and adzes, but they may have been used in securing food by hunting, or in warfare as mentioned on p. 184, or even as agricultural implements. Those of stone pecked and polished, might have been hafted by winding a withe about them or by fitting them into a hole in the side of a fairly large handle. The thin celts chipped from jasper, and celt-like pieces of limestone, may have been used in the same ways, but the latter seem better adapted for use as skin scrapers or as agricultural implements.

Hammerstones. There are two kinds of hammerstones, simple and pitted. Typical specimens of both are shown in Plate XXXII. Simple

[1] Mills, (b), p. 37.
[2] Mills, (b), p. 43.
[3] Mills (b), p. 45.

hammerstones consist of pebbles or masses of rock showing more or less extensively battered and sometimes chipped surfaces on their ends or entire circumference (Plate XXXII, Figs. 1, 2) and sometimes are faceted (Plate XXXII, Fig. 3). These are apparently simple or less specialized forms of the pitted hammerstones, perhaps such as were used only temporarily or only for pounding and never as an anvil. One specimen is apparently a celt which has been used as a hammerstone until both poll and edge are very blunt.

The pitted hammerstones consist of pebbles or blocks of somewhat water worn stone which were more or less pecked on the middle of either side, apparently for the reception of the thumb upon one side, and the middle finger on the other to facilitate holding the object as a hand hammer. One specimen (Plate XXXII, Fig. 6) has two such pits on each side. One or both ends, one or both side edges and sometimes the entire circumference of such hammers are battered from use in pounding. No carved hammers made of stone were found.

These hammerstones were probably used in flaking stone for the manufacture of chipped points, driving stakes, pounding meat, cracking nuts, as anvils or for several such purposes. Hammerstones were abundant in the Gartner village site.[1] Some were battered on one end, others on both.

Pitted Stones. Pieces of limestone or sandstone bearing one (Plate XXXII, Fig. 7) or several pits were occasionally found. The pits are usually about an inch and a half to two inches in diameter by perhaps three quarters of an inch deep and appear to have been pecked into form. The use of pitted stones has long been conjectural. A large piece of sandstone with pits on both sides was found by Mills in the Adena Mound.[2]

Whetstones. Fragments of sandstone and even of gritty limestone worn flat or concave upon one side were found (Plate XXXIII, Fig. 1). These were evidently whetstones for shaping and sharpening various tools. Undoubtedly the stone celts were sharpened by rubbing them upon such grinders. Very likely they were used in sharpening animal bones and antler that were to be used for awls, arrow points, and for similar purposes. In fact, they may have been used in grinding and shaping some of the smooth and flat objects made of shell. One (Plate XXXIII, Fig. 2) is of celt shape. Other grinders have one or more V-shaped grooves extending across them. These (Plate XXXIII, Fig. 4) were apparently also used for sharpening the tips of arrow points made of antler, awls made of bone, etc., although some of the cuts in the stone are rather too sharp to have been so formed. Whetstones of fine grained sandstone, some finger-shaped pieces used upon

[1] Mills, (b), p. 40.
[2] Mills, (a), p. 9.

all sides, others symmetrically cut with edges and sides smoothed, but the majority flat, with grooves probably caused by sharpening bone needles and awls and by the manufacture of shell objects, are common in the Gartner site.[1] One whetstone made of sandstone was found in the Adena Mound.[2]

Arrow-shaft Smoothers. Sometimes pieces of sandstone which may have been used as whetstones, being flat upon one or more sides, have one or more grooves semicircular in cross section. These (Plate XXXIII, Figs. 3, 6) were probably used in smoothing and straightening arrow-shafts, or in smoothing the bone and antler cylinders, such as are shown in Plate LI, Fig. 15; Plate XXXIII, Fig. 9; and Plate XLIII, Figs. 1, 2. The two fragments shown in Plate XXXIII, Figs. 5, 6, resemble the semi-cylindrical arrow-shaft smoothers of the Northwest plateaus. The groove in the first seems rather sharp for such a purpose. It may be unfinished or intended to become more semicircular in section by use.

Chisels of Bone. Objects resembling chisels made of fragments of bone especially of the metatarsus of the deer were occasionally found. These may have been used in wood working[3] or possibly as skin fleshers or grainers.

Pins and Cylinders of Antler and Bone. Pin-shaped objects of antler (Plate XXXIII, Fig. 8) and bone, one of them (Plate XXXIV, Fig. 10) having an incision setting off a knob of bone and head and cylinders of antler (Plate XXXIII, Fig. 9; Plate XLIII, Figs. 1, 2; Plate LI, Fig. 15) may have been used as tools if not in games discussed on p. 209. Possibly the cylinders may have been flakers. The large section of antler with rounded ends and having a natural ridge scraped smooth shown in Plate XXXIII, Fig. 10, may also be a flaker or it may be an unfinished knife handle.[4] Such handles were found in 1884 at the Turner Group[5] in the Little Miami Valley, Ohio,[6] which is not far from Mason County, Kentucky. In the interior of British Columbia antler knife handles are sometimes boiled to soften them so that the knife blade may be driven in easil, after which the antler becomes as hard as ever.[7]

Knives made of Beaver Teeth. The lower incisor of the beaver is sometimes cut off across the base by grooving and breaking, and a portion of the inner surface is grooved out longitudinally (Plate XXXIII, Figs. 11–13),

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[1] Mills, (b), p. 59.

[2] Mills, (a), Fig. 21, p. 22.

[3] Cf. p. 196.

[4] Cf. also Plate LI, Figs. 9, 12.

[5] The Turner Group finds belong to the Hopewell Culture, however, while the Fox Farm remains are of the Fort Ancient Culture. See p. 233.

[6] Putnam, (b), Figs. 8, 9, p. 157.

[7] Smith, (c), p. 166.

or cut off flat (Plate XXXIII, Fig. 14). Two of these last were found. The first two have the left side of the cutting edge broken away as if to narrow it. The last has a groove across the base. All these may have been used as points for knives suitable for wood carving. Such knives hafted in wooden handles are used as chisels in making snowshoes and also as crooked knives by the Eastern Cree.

Chipped Flakes. Some of the sharp stone flakes (Plate XXXIII, Fig. 16; Plate XXXVI, Fig. 7) and the chipped points may have been used as knives. The edge on one (Plate XXXIII, Fig. 15) is rubbed smooth, possibly from such use. Objects of stone (Plate XXXVI, Fig. 8), pottery (Plate XXXVI, Fig. 9), shell (Plate XXXVI, Figs. 10, 11), bone (Plate XXXVI, Figs. 12–16), teeth (Plate XXXVI, Figs. 17, 18), and antler (Plate XXXVI, Figs. 19–21) bearing cuts are mentioned on p. 206.

Chipped Drill Points. Slender chipped points of stone such as those shown in Plate XXXIII, Figs. 17–19, and Plate XXXVII, Fig. 12, were probably used as points for drills. Some of them have wide tangs, others have bases but little less acute than the point. These were probably hafted in the split end of a cylindrical shaft. The drill may have been revolved between the palms, the palm and the thigh, by means of a bow or with a pump drill attachment. Such points make a tapering hole such as may be seen in a large number of objects found here. Among them are some made of stone (Plate XXXVII, Figs. 1–2), pottery (Plate XXXVII, Fig. 3), shell (Plate XXXVII, Fig. 4), bone (Plate XXXVII, Fig. 5), teeth of bear (Plate XXXVII, Fig. 6), wolf (Plate XXXVII, Fig. 7), deer (Plate XXXVII, Fig. 8), elk (Plate XXXVII, Fig. 9), and shell of the turtle (Plate XXXVII, Fig. 10).

No hollow reeds or other drills corresponding to our diamond drill were found, unless we may consider some of the bone tubes, shown in Plate XXXVI, Figs. 13, 14, as having been used for this purpose, but they certainly show no signs of such use. We did find a single specimen, a fragment of a pipe (Plate XXXVII, Fig.13), showing drilled holes which left a core such as would result from drilling with a hollow drill, and we also found a number of specimens with holes having parallel sides, such as may have been drilled by this process (Plate XXXVII, Fig. 11). The method of manufacture of certain objects involving the process of drilling is again mentioned on p. 206.

Tools used by Women

Tools supposed to have been used by women other than those employed in the preparation of food are shown on Plates XXXIV–XXXV. They include scrapers, awls, and needles.

Scrapers chipped out of Stone. A few of the less acute chipped points of stone may have been used as small skin scrapers. The one shown in Plate XXXIV, Fig. 1, made of pinkish chalcedony is rubbed smooth across the edge as are the chipped stone skin scrapers of the Thompson River region in the southern interior of British Columbia. The latter, however, are much larger.

The chipped discs of limestone shown in Plate XXII, Fig. 2, and the chopping knife of limestone (Plate XXII, Fig. 3), as well as the oblong also chipped from limestone (Plate XXII, Fig. 4, pp. 188, 189, and 195), may have been inserted in the split end of a stick and used as a skin scraper similar to those employed in the Thompson River region.[1] However, such skin scrapers are polished across the edge from use, while none of these discs show signs of wear.

Scrapers made of Bone. Scrapers and fragments of such objects made from the metatarsal or metacarpal bone of the deer (Plate XXXIV, Fig. 2) were frequently found. The middle portion of the posterior surface of this bone was grooved out almost to the end, being cut through to the marrow canal in such a way that along about one third of the length of the bone at the middle a sharp edge is formed where the grooving cuts off the outer part of the sides of the bone. This portion of the implement would serve as a skin scraper. Such scrapers are found in the Thompson River region[2] and I have seen the Thompson River Indians scrape skin with part of an old scythe blade about the length of one of these skin scrapers. The ends of the scythe blade were wound with rags to protect the hands and to form convenient handles. Similar objects[3] made of horse ribs, wound at the ends with sagebrush and rags and used for the same purpose were collected from these Indians by Mr. James Teit. The fragment of a bone object with little pits drilled in one end (p. 188, Plate LIII, Fig. 4) may have been used as a scraper. Scrapers, made of the metapodial bones of the elk and deer were found by Mills in the cremation ashes in the Gartner Mound.[4] Broken pieces of these were found in various parts of the mound but only a

[1] Teit. Plate XIV, Fig. 1; Smith, (a), Fig. 64.
[2] Smith, (a), Figs. 65, 66; (b), Fig. 356.
[3] Teit. Figs. 128, 129.
[4] Mills, (b), p. 8.

few of them in the cremation ashes. Scrapers made of the shoulder blade of the deer were occasionally found in the Gartner village site and some made from the shoulder blade of the elk were found but the unworked bones were rarely seen.[1] The celt-like objects made of antler mentioned on p. 196 (Plate XXXI, Fig. 10; Plate XXXIV, Fig. 14), may have been used by the women in scraping skins, as also may the bone chisel shown in Plate XXXIII, Fig. 7.

Manufacture of Scrapers made of Bone. The history of the manufacture of one of these scrapers is illustrated by some of the specimens. The natural metatarsal and metacarpal (Plate XL, Fig. 1) bones of the deer were found. The grooving was perhaps done with flakes of stone or chipped stone knives. This is suggested by numerous scratches at the ends of some of the grooves such as would be made by the slipping of a tool. Plate XL, Fig. 2, shows a chip such as may have been used in cutting them, Plate XL, Fig. 6, a sandstone such as may have been used in grinding them to a sharp edge. Plate XL, Fig. 3, illustrates such a scraper broken as from use. A few entire and many broken scrapers made of the anterior and posterior metapodial bones of the deer and elk were found throughout the Gartner village site. The natural bones were rare, nearly all of them being broken, made into scrapers, or in process of being made into them. Mills believes a blunt flint implement was used in making these scrapers.[2]

Awls. Awls made of bone were among the most common finds. The range of forms and sizes is illustrated in Plate XXXIV, Figs. 3–15, and Plate XXXV. They were probably used in making holes in buckskin and similar material in order to sew moccasins and other garments. Some may have been used in making baskets, weaving nets, decorating pottery or even as forks for the preparation of food, although it would hardly seem likely that they were used in eating. Some of them, especially the long ones, may have been used as spear points or daggers in hunting or warfare and the smaller specimens may have served as fish hooks or barbs for large hooks. It is possible that the notches considered to be for decorative purposes were intended to facilitate fastening these pointed bones to some sort of handle or fish hook. The points of some of them are polished by use, others are polished throughout their entire surface probably by long handling.

One of the most numerous types is shown in Plate XXXV. These awls are made of the proximal end of an ulna, or in the case of the one shown in Plate XXXV, Fig. 4, are shaped so that they resemble other awls made of that bone. The articular end or the part shaped like it forms a convenient

[1] Mills, (b), p. 43.
[2] Mills, (b), p. 43.

handle. Fig. 1 illustrates one made of the ulna of a young elk which has simply been sharpened at the slenderer end. An awl made from the ulna of an elk but with the expanded portions removed was found in the Gartner village site.[1] Fig. 2 illustrates one of this type of awl made of the ulna of a deer, the animal whose ulna was most frequently used, and it resembles in every way the awls made of the corresponding bone of the elk just described. Fig. 3 illustrates one which has not only been sharpened, but has lost the epyphysis and the sutural surface has been rubbed smooth. This probably is the case only in awls made from bones of young animals. It is highly polished. Awls, always with acute points, made of the ulna of the deer were found in every part of the Gartner village site.[2] Sometimes these bones in their natural condition without having been sharpened (Plate XL, Fig. 7) were found and it would seem that such a natural bone could be made into an awl (Plate XL, Fig. 8) in a few moments by roughly rubbing it into shape on a grooved piece of sandstone (Plate XL, Fig. 6) such as were frequently found. Fig. 4, Plate XL, illustrates one of this type, not made of an ulna, but shaped like an ulna. It is cut out of the pubic bone of a black bear. The ulnae of the black bear (Plate XXXV, Fig. 5) and lynx (Plate XXXV, Fig. 6) were also made into awls.

Perhaps the most numerous type of awl is that shown in Plate XXXIV, Fig. 3, made from the proximal part of the tarsometatarsus bone of the wild turkey. The articular end of this bone was used as a handle, the other end being cut off across the marrow canal and sharpened. Sometimes this type of awl was notched apparently for decorative purposes (Plate XXXIV, Fig. 4). Awls made from the tarsometatarsus of the wild turkey were perhaps the most frequently found implements in the Gartner Mound and in the village site, where they were found in the graves, refuse pits, and tipi sites. Some of them are ornamented with notches.[3]

We found specimens illustrating the method of manufacture of this type of bone awl (Plate XL, Figs. 2, 6, 9–11). This series begins with a natural tarsometatarsus from a male wild turkey (Plate XL, Fig. 9) bearing a spur, and includes a flake (Plate XL, Fig. 2) or a chipped stone point for use as a knife in cutting the bone and a whetstone or grinder (Plate XL, Fig. 6) used for shaping and sharpening it. The notches in those decorated (Plate XL, Fig. 11) could have been made with the flake of stone. This awl was found in every stage of manufacture in the Gartner Mound.[4]

Similar awls were made from the tibio-tarsus of the wild turkey; these

[1] Mills, (b), p. 46.
[2] Mills, (b), p. 46.
[3] Mills, (b), p. 47.
[4] Mills, (b), p. 8.

were nearly as numerous as the previously mentioned type. Some (Plate XXXIV, Fig. 5) are made from the distal part, perhaps a greater number of the proximal part (Plate XXXIV, Fig. 6). Some of the latter are decorated by notches (Plate XXXIV, Fig. 7). One has a gouged perforation near the base possibly for suspension. The articular ends usually form the handle, but often in those made from the proximal part this surface is cut away.

The history of the manufacture of these two types of common awls from this bone is suggested by the specimens found, some of which are shown in Plate XL. The natural tibio-tarsus bone, a rather small one, probably of a female bird, is shown in Fig. 12. Fig. 14 illustrates an awl made from the distal end while Fig. 13 shows one made from the proximal end, a flake, such as may have been used in cutting the bone, and a grindstone such as was probably used to smooth it are shown by Figs. 2 and 6, respectively. The distal end of the metatarsus or of the metacarpus bone of the deer was occasionally made into awls (Plate XXXIV, Fig. 12; Plate XL, Fig. 4). Sometimes it was cut in two by grooving and breaking so that the two bones which were fused together to make it were separated again and one or both parts were made into awls by sharpening (Plate XXXIV, Fig. 13; Plate XL, Fig. 5). Whether made of an entire or of half an end, the articular surface usually served as a handle. An awl made of half of the distal end of the metapodial bone of the deer was found at the Gartner village site and Mills considers that it may have been made from a broken scraper.[1] In a few cases, however, (Plate XXXIV, Fig. 14) the awl was made of the proximal end which was cut away and smoothed.

The life history of these awls is also suggested by objects found in this site. The natural bone (Plate XL, Fig. 1) was seldom found, but flakes of stone (Plate XL, Fig. 2) such as could have been used to cut it and grindstones (Plate XL, Fig. 6) on which it could be ground to shape, as well as finished awls of both styles (Plate XL, Figs. 4, 5) were frequently found. Awls made from other bones (Plate XXXIV, Fig. 15) were also found and not a few made from fragments of the long bones of quadrupeds (Plate XXXIV, Fig. 8) and birds (Plate XXXIV, Fig. 9) were frequently secured. An awl made of one of the heavy bones of the deer or elk was found in the Gartner Mound.[2] Awls made of the shoulder blade of the elk and Virginia deer were found in the Adena Mound[3] and in the Gartner village site but the elk bone in a natural state was rarely found in the latter.[4] An awl

[1] Mills, (b), p. 45.
[2] Mills, (b), p. 19.
[3] Mills, (a), p. 24.
[4] Mills, (b), pp. 43, 47.

decorated with incised lines encircling it near the point and having an enlargement about one quarter of the way back from the point to the base was found in the Gartner Mound.[1] A small pointed object was found here in Kentucky (Plate XXXIV, Fig. 10) which is a sharpened cylindrical piece of the wall of a large bone. It was originally broken off by grooving and is also grooved about a quarter of an inch from the present base. It is probably intended for some kind of an awl. The splint bone (Plate XXXIV, Fig. 11) from the leg of the deer may have been used for an awl. A double pointed awl made from the heavy leg bone of a deer, one made from the tibio-tarsus of a bird, and one made of antler were found in the Gartner site.[2] Some were beautifully wrought and highly polished. They were also found in the Gartner graves.

Needles. No very fine needles were found but the object made of bone shown in Plate XXXIV, Fig. 17, is apparently a needle with the eye broken out and the penis bone of the raccoon perforated at the distal end (Plate LI, Figs. 10, 11) may have been used as a needle. The highly polished and pointed pieces of long bones of birds (Plate XXXIV, Figs. 9, 16) may be needles in process of manufacture; as too may be the piece of bone or antler partly drilled at one end (Plate XXXIX, Fig. 10), all of which were found here.

The bone object shown in Plate LI, Fig. 16, may possibly but not probably have been used as a large netting needle. It is made from the wall of a large long bone of some animal, and has a lanceolate point, cylindrical shaft, and a perforation through its irregular base. Fragments of what may have been the same kind of an object are shown in Plate XXI, Figs. 6, 7, the groove around the broken basal end of the latter may have been to facilitate attaching a thread or cord in an attempt to use it after it was broken. Needles made of bone were only occasionally found, but broken pieces of them were numerous in the Gartner site all of which had a circular eye in the largest end.[3] One made of bone was found by Mills in the Adena Mound.[4]

Manufacture of Needles. The history of the manufacture of this object is suggested by a few of the specimens found here. Plate XLII, Fig. 4, shows the natural penis bone of the raccoon; the next specimen is perforated vertically through the tip and the articular knobs of the base have been cut off. The perforating could have been done with a drill point chipped from stone (Plate XLII, Fig. 3) by continuing the drilling until

[1] Mills, (b), p. 16.
[2] Mills, (b), p. 48
[3] Mills, (b), p. 48.
[4] Mills, (a), pp. 11, 24.

the point was far through the bone so as not to form a conoid or biconoid perforation. Some of the long bone tubes may have been needle cases.[1]

The bone object shown in Plate LIII, Fig. 3, cut out of the shoulder blade of a deer and perforated with fourteen drilled or gouged holes, some of them tapering from one side and some from the other, and all but one arranged so that they form a somewhat M-shaped figure, may possibly have been used as a sewing implement, perhaps for the smoothing of sinew. The same may be said of the perforated bone object shown in Plate XXXVII, Fig. 5. On the other hand, the former object may have been used with a short bone tube or bead as a spreader for roached hair (p. 215).

Spinning and Weaving. While some of the perforated discs of stone (Plate XXXVII, Fig. 1; Plate XLI; Plate XLIV), of pottery (Plate XXXVII, Fig. 3), and of shell (Plate XXXVII, Fig. 4; Plate L, Figs. 9–13), may have served as spindle whorls it does not seem probable on account of the small perforation in some and the biconcave surfaces in many, that they were made for adjustment to a shaft and used in this manner. Some of them bear geometric designs, one a realistic pictograph. These are further mentioned on p. 210. No other objects supposed to have served in spinning or weaving were found and the only evidence of spinning is the impressions on pottery of twisted cord which may have been made without the use of a whorl (Plate XXIV, Fig. 6; Plate XXV, Fig. 3). The netting (Plate XXI, Fig. 15; Plate XXV, Figs. 1–2) shown by such impressions is the nearest approach to evidences of weaving.

Finger Nails and Tips. The finger nails and tips seem sometimes to have served in the place of tools in forming, or at least in decorating, pottery as indicated by the impressions on vessels (Plate LV, Figs. 1–10).

Processes of Manufacture.

The processes employed in making the various objects found or indicated by finds on this farm comprise: rubbing, cutting, drilling, punching, chipping, flaking, pecking, modeling, impressing, twisting, knitting, and painting. These processes may each be illustrated by a series of specimens selected from the objects found.

Rubbing. Rubbing or polishing was the process by means of which practically all the objects formed by pecking and some of those formed by chipping were finished, also by means of which many objects were made. The rough grinding was no doubt done with coarse grindstones, like those

[1] Cf. Boas, Fig. 234, p. 433.

described on p. 197 and shown in Plate XXXVI, Fig. 1. The finer grinding or polishing was probably done with finer grinding stones and perhaps by rubbing with the hand or some fine materials, the nature of which is only conjectural. The results of this process are shown in objects made of stone (Plate XXXVI, Fig. 2), pottery (Plate XXXVI, Fig. 3), bone (Plate XXXVI, Fig. 5), antler (Plate XXXVI, Fig. 4), teeth (Plate XLIX, Fig. 18), and shell (Plate XXXVI, Fig. 6).

Cutting. Cutting is illustrated by the flake of stone, possibly a flake-knife, shown in Plate XXXVI, Fig. 7, and the beaver tooth knives shown in Plate XXXIII, Figs. 11–14 both of which artifacts may have been used for cutting. The refuse from the process was probably too minute to be discovered; at least we found nothing which we recognized as such, but the products of this process are shown by cuts on objects of the following materials: stone (Plate XXXVI, Fig. 8), pottery (Plate XXXVI, Fig. 9), shell (Plate XXXVI, Figs. 10–11), bone (Plate XXXVI, Figs. 12–16), eagle claw (Plate XVIII, Fig. 5), antler (Plate XXXVI, Figs. 19–21), and teeth (Plate XXXVI, Figs. 17–18). The history of the manufacture of arrow tips of antler and fish hooks of bone in which this process was used has been described on pp. 185 and 187 and is illustrated in Plate XXXVIII, Figs. 8–21, and Plate XXXIX, Figs. 1–10.

Drilling. Drilling is illustrated by drills chipped from stone which were described on p. 199, and shown in Plate XXXVII, Fig. 12. Drilling with a chipped stone drill usually resulted in a perforation taper[illegible] from the side from which it was drilled. In some cases the drilling [illegible] from both sides, the two holes meeting and resulting in a bore w[illegible] tapered from both ends, or where the process was continued long enough, the taper was lost and the hole came to have parallel sides. The refuse from this process was too minute for us to discover, but the results of the work are shown on objects made of stone (Plate XXXVII, Figs. 1, 2), pottery (Plate XXXVII, Fig. 3), shell (Plate XXXVII, Fig. 4), bone (Plate XXXVII, Fig. 5), teeth (Plate XXXVII, Figs. 6–9), turtle shell (Plate XXXVII, Fig. 10), and antler (Plate XXXVII, Fig. 11).

Drilling was also done with a tube which made a nearly strai[illegible] sided bore and sometimes left a core as seen in the lower hole in the pipe shown in Plate XXXVII, Fig. 13. Sand and water may have accompanied the use of such a drill.

Punching. Punching was employed as a process as is shown by the holes in the bottom of some of the objects made of pottery, perforated from the inside before firing (Plate XXXVII, Fig. 14). This process caused the pottery to be depressed around the punched hole on the inner side and elevated in a little ring around the opening on the opposite side.

Chipping. A hammerstone (Plate XXXVIII, Fig. 2; Plate XXXII, Figs. 1–6), such as is described on p. 196 is probably the tool that was used for chipping. Chips of stone, the refuse from this process are shown in Plate XXXVIII, Fig. 3. Chipping is seen on the unfinished and rejected chipped objects shown in Plate XXXVII, Fig. 15; Plate XXXVIII, Fig. 4 and on the chipped points (Plate XX), limestone discs and oblongs (Plate XXII, Figs. 2–4), and also on the edges of the unfinished pottery discs shown in Plate XXXVII, Fig. 16; Plate XLI, Fig. 12. The method of manufacture of chipped points by the process of chipping has been described on p. 184 and is illustrated in Plate XXXVIII, Figs. 1–3.

Flaking. Flaking to finish some chipped objects was probably done with the bone and antler cylinders mentioned on p. 198 and shown in Plate XXXVIII, Fig. 5, and Plate LI, Fig. 15. Flakes, the refuse from this process were found and are shown in Plate XXXVIII, Fig. 6. The finished product, the result of flaking, is shown in Plate XXXVIII, Fig. 7, and also by part of the work on the chipped points (Plate XX), and possibly by some of the work on the limestone discs and oblong (Plate XXII, Figs. 2, 4), while the history of manufacture by means of flaking is described on p. 185 and illustrated by the series of specimens shown in Plate XXXVIII, Figs. 4–7. Short cylinders of antler, flat, battered, and splintered on one end, but convex on the other, perhaps flakers, and if so probably used with percussion on the end instead of with lateral pressure as the long cylinders were probably used, were found by Mills[1] in the Baum site.

Pecking. The process of pecking is illustrated by some of the specimens found, notably by the celts, stone discs, and pipes (Plate XXXVII, Fig. 17; Plate XXXI, Figs. 1–8; Plate XLIII, Fig. 16; Plate XLVI, Fig 7). These show the peck marks caused by striking the stone with a pebble or hammerstone. The refuse, fine dust, from this process is too minute to be found. After pecking the objects into shape they were often finished by grinding and polishing which effaced part of the peck marks or all of them if continued long enough. Finished objects made by this process are shown in some of the figures in Plates XXXI, XLIII, XLVI. The method of manufacture of celts, discs, and pipes by this process has been mentioned on pp. 195, 210, and 213.

Modeling. Modeling was used in making the rims and handles of pots and in making pipes. The tools used in modeling have not been certainly identified. They may have been made of wood, but it is possible that some of the bone objects notably those mentioned on p. 201 and shown in Plate XXXIV, Figs. 3–15 were used for that purpose. Signs of the use of the fingers

[1] Mills, (c), p. 65.

and finger nails in modeling have been mentioned on p. 205. The finished products of modeling are shown in Plates XXVI–XXX; Plate XLVIII, Fig. 1; Plate LI, Figs. 1, 2, 4–6; and Plates LIV–LIX.

Impressing. Impressing upon pottery, before firing, with twisted cords and net work or cord and net covered paddles (Plate XXV, Fig. 1), carved paddles (Plate XXV, Fig. 6) and what may be a fruit pit (Plate LV, Fig. 11) seems to have been an intentional process of manufacture, at least in some cases. Some of the impressions may have been accidental or a by-product, as it were, of the manufacture of pottery dishes.

Twisting. The process of cord-making is known to have existed through the impressions on pottery previously described and shown in Plate XXV, Fig. 3. Cord was probably twisted with the fingers or upon the thigh and was no doubt made from vegetable material, possibly bass wood bark, as among modern Indians inhabiting the same linguistic area. No tools or waste from this process have been recognized as such among the finds made here.

Knitting. That net-making existed as a process, we know from the impressions of netting on pottery frequently mentioned before and shown in Plate XXV, Figs. 1, 2. Some of the bone objects, notably the awls and the spatulate bone shown in Plate LI, Fig. 16 (p. 185) may have been used as shuttles or needles. No other tools or waste material from this process have been recognized as such if found at all.

Painting. The process of painting is known to have existed through the line work on the fragment of pottery described on p. 223 and shown in Plate LIV, Fig. 11. The tools used in the process are unknown.

History of Manufactured Objects.

The history of the manufacture of some classes of objects has been discussed with the description of each; points chipped out of stone on p. 184 (Plate XXXVIII, Figs. 1–7); rubbed out of antler on p. 185 (Plate XXXVIII, Figs. 8–18); fish hooks of two kinds on p. 187 (Plates XXXIX, Figs. 1–9); pottery on p. 190 (Plates XXIV–XXX; Plate LV); celts made of antler on p. 196 (Plate XXXIX, Figs. 11–14); scrapers made of bone on p. 201 (Plate XL, Figs. 1–3); and awls of several types on p. 202 (Plate XL, Figs. 1–2, 4–14). The history of the manufacture of other artifacts will be discussed: perforated phalanx bones on p. 210 (Plates XIX, Figs. 6–9); perforated discs of stone on p. 210 (Plate XLI, Figs. 1–10); perforated discs of pottery on p. 211 (Plate XLI, Figs. 6–10; 11–15);

whistles made of bone on p. 212 (Plate XLII, Figs. 1–3); perforated penis bones of the raccoon on p. 204 (Plate XLII, Figs. 3–5); beads made of bone of various kinds and of various animals on p. 216 (Plate XLII, Figs. 10–14; 15–17); and pipes made of stone on p. 213 (Plates XLVI and XLVII).

Games, Religious Objects, Pipes, and Amusements.

A number of objects which were probably used in games and some of which were possibly so employed were found. They are shown in Plates XLIII and XLIV.

Tubes and Cylinders. The bone tubes mentioned on p. 186 (Plate XXI, Figs. 8–10), the cylinders made of bone mentioned on p. 198 (Plate LI, Fig. 15), and the cylinders made of antler mentioned on pp. 185, 198, 207, 221, and (Plate XLIII, Figs. 1–2) may have been used in gambling.

Dice. The astragalus bone of the deer (Plate XLIII, Fig. 8) may have been used as a die.

Ring and Pin Game. The phalanx or toe bones of the elk (Plate XLIII, Fig. 4) and deer (Plate XLIII, Figs. 5–7) perforated through the distal articulation and cut off around the proximal end were possibly used in a game resembling ring and pin. Digits of the deer with the proximal part cut off and the distal end perforated are found in abundance in the refuse pits but none have been found in the graves of the Gartner site.[1] None of these bones found here by us were shaped for use as arrow points like some of those described by Mills.[2]

Some of the bone awls described on p. 201 (Plate XLIII, Fig. 3) may have been used in connection with these toe bones for the pin. The phalanx bone or bones representing the ring may have been tossed up and caught on the point of an awl. These phalanx bones may be compared with others drilled and cut which are known to have been used in this game among the Algonkin, Athapascan and Siouan tribes[3] where they are often drilled and notched. However, the same general game, but with some substitute for the phalanx bones is widely distributed in America as described by Culin. The number of the phalanx bones used is not constant. The game is played both for stakes and as a child's amusement. Possibly the perforated object cut out of the thin shoulder blade of a deer, mentioned on p. 205 and shown in Plate LIII, Fig. 3, may have served the purpose of the ring in this game. The humerus of a wild turkey with three perforations on each side near the

[1] Mills, (b), p. 58.
[2] Mills, (b), p. 41.
[3] Culin, p. 527.

head, found by Mills in the Gartner site [1] may possibly have been used as the ring rather than for the attachment of rattles as mentioned on p. 212.

Manufacture of Phalanx Bone Objects. The history of manufacture of these phalanx bone objects is at least partly illustrated by specimens found here. The natural phalanx bone (Plate XLII, Fig. 6) was occasionally found, points chipped from stone, such as the one so made from chalcedony shown in Plate XLII, Fig. 7, which were probably used for cutting off the proximal end of the phalanx bones were common, drill points chipped from stone, such as the one chipped from chalcedony shown in the next figure, which were nearly as numerous were no doubt used for making the perforation in the distal end of the bone and the completed object made of the phalanx bone by cutting off the proximal end and perforating the distal end were fairly common.

Discs. It seems possible that some of the stone discs (Plate XLIII, Figs. 12–17; Plate XLIV) and possibly some of those that are perforated (Plate XLIV) may have been used in gambling. The discs and perforated discs made from potsherds (Plate XLIII, Figs. 9–11) and the perforated discs made of shell (Plate L, Figs. 9–11) may have been used in the same way, or possibly some of the stone and pottery discs were so used, while others were employed for spindle whorls (p. 205). It is possible that the chipped limestone discs (p. 189; Plate XXII, Fig. 2) were used in the same or a similar game. A discoidal stone [2] which in a way resembles these, but is larger, was found in the Gartner Mound.

Manufacture of Discs made of Stone. The manufacture of the discs made from stone may be illustrated from the specimens in the collection. The series consists of a piece of sandstone (Plate XLI, Fig. 1), a celt chipped and ground from jasper, such as may have been used to chip such stone into discs (Plate XLI, Fig. 6), a piece of sandstone chipped to a disc shape (Plate XLI, Fig. 2), fine-grained sandstone, such as may have been used to grind and smooth discs (Plate XLI, Fig. 7), a drill point chipped from chert such as may have been used for perforating discs (Plate XLI, Fig. 8), a piece of sandstone chipped to disc shape, roughly ground and partly drilled (Plate XLI, Fig. 3), a flake of jasper such as may have been used for countersinking and incising discs (Plate XLI, Fig. 10), a piece of sandstone chipped to disc shape roughly ground, drilled and countersunk (Plate XLI, Fig. 4), a small drill point chipped from chalcedony such as may have been used for dotting discs (Plate XLI, Fig. 9) and a finished perforated disc of sandstone marked with lines and dots (Plate XLI, Fig. 5). Some of the discs (Plate XLIII, Figs. 15–17) were pecked into shape and polished.

[1] Mills, (b), p. 57.
[2] Mills, (b), p. 13.

Manufacture of Discs made from Potsherds. The manufacture of discs made of potsherds may also be illustrated. The series consists of a potsherd (Plate XLI, Fig. 11), a stone that may have been used for chipping potsherds (Plate XLI, Fig. 6), a disc chipped from a potsherd (Plate XLI, Fig. 12), a grindstone for smoothing the edge of such a disc (Plate XLI, Fig. 7), a disc made of a potsherd with edge rubbed smooth (Plate XLI, Fig. 13), a point for a drill chipped from chert for perforating the disc (Plate XLI, Fig. 8), a disc made of potsherd with edge rubbed smooth and center perforation started (Plate XLI, Fig. 14), and the finished product, a disc chipped from a potsherd with the edges rubbed smooth and the center perforated with a biconical hole made by drilling from both ends (Plate XLI, Fig. 15).

Religious Objects. Some of the objects considered as personal ornaments on p. 214 may have been charms or amulets. The pipes considered on p. 212 were probably used in ceremonial and religious ways. Perhaps some of the bone tubes mentioned on p. 209 may have been used in such ceremonies. Similar tubes have been used by the Arapaho in the Sun Dance and by the Ojibway Indians living in Michigan.[1] The modeled pottery figures on and near the rims of the dishes (Plate LIV, Figs. 3–10) suggests that some of the dishes may have had a religious significance or may have been used in religious ceremonies as may the painted design (Plate LIV, Fig. 11) on the potsherd described on p. 223. The incised realistic scratches upon the objects shown in Plate LII, Figs. 8–13, the geometric designs shown in Plate LII, Figs. 2–6, and even some of the sculptures in stone, such as those shown in Plate LII, Fig. 14, and the modeled forms on pottery, such as the lizard and fish shown in Plate LIV, Figs. 9–10, may have represented manitous or religious symbols.

Rattles. The fragment of perforated turtle carapace mentioned on p. 199 (Plate XXXVII, Fig. 10) may be part of a rattle used on the legs in religious dances; for, according to Mills,[2] a rattle made of the carapace of a turtle perforated for attachment and containing small pebbles was found on the leg of a skeleton in the Gartner Mound in Ohio. The skulls of wild turkeys usually perforated with one or more holes in the crown and containing from one to five pebbles which Mills believes to be knee rattles were often found in the Gartner Mound and below the knees on the skeletons in the Gartner site and at the Baum village along Paint Creek, Ohio, where wild duck skulls were also found.[3] The humerus of a wild turkey with three perforations on each side near the head was found in the Gartner site.

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[1] Smith, (f), p. 283.
[2] Mills, (b), p. 23.
[3] Mills, (b), pp. 10, 23, 59.

This Mills considered to have been for the attachment of rattles but it may possibly have been used as the ring in the ring and pin game.[1] Perforated humerii of this bird were occasionally found throughout that site.

Gorgets. Perforated gorgets made of stone were not frequently found, but a fragment of a gorget is shown in Plate L, Fig. 1. The surface of the stone is worn down around the perforation and in the lower edge may be seen part of an old perforation through which the object has been broken. The broken edge was afterwards somewhat smoothed. The object shown in Fig. 2 of the same plate may be a gorget although considered on p. 219 as an ornament. Another fragment of what may be a gorget, is shown in Plate XXXVII, Fig. 2. It was found in the general diggings of mound 1. There is a perforation through this fragment and the edge of the stone is grooved opposite it as if an old perforation had been broken out and the present one made since. There are notches in the side edges. After all, these may not have served as religious objects.

Whistles. The hollow light bird bones and the few small mammal bones cut off at the ends and drilled like pan pipes (Plate LI, Figs. 13–14) may have been used as whistles in religious ceremonials rather than for animal calls as mentioned on p. 186 or for amusement (p. 214).

Manufacture of Whistles. The history of the manufacture of this object is suggested by some of the specimens found here. Natural bird bones were occasionally seen. One of these (Plate XLII, Fig. 1) has the ends broken off; another, shown in the next figure, has seven vents and at one end another vent partly drilled. The third figure in this plate shows a drill point chipped from stone, such as may have been used in drilling these vents. The supposedly finished object is shown in Plate LI, Figs. 13, 14.

Pipes. Pipes made of stone, especially yellowish sandstone, were frequently found. Some were of limestone, but only one of pottery (Plate XLV, Fig. 11) was seen. The range of forms is shown in Plates XLV–XLVI, and includes the simple bowl shape (Plate XLV, Figs. 1–3), the elbow type (Plate XLV, Figs. 4–6), the platform type (Plate XLVI, Figs. 5–8), and specialized forms of these types. In the elbow pipes, the angle between the axis of the bowl and that of the stem is much greater than a right angle in most cases. There is also a rectangular pipe having nearly square sides, the bowl and stem of which are made in adjacent edges (Plate XLV, Fig. 10). Stone pipes, finished and unfinished, mostly of fine-grained sandstone, several of greenish argillite, and others of clay were found in the Gartner site. One is an elbow pipe made of compact sandstone, another a platform

[1] Mills, (b), p. 57

pipe of greenish argillite.[1] A platform pipe made of reddish brown sandstone was found in the Gartner Mound.[2] No tubular pipes were found on the Fox Farm by us; but one of human form made of clay was found by Mills in the Adena Mound.[3]

Some of the pipes found here in Kentucky bear incised geometric designs, others realistic sketches, among which the human face appears. Still another is sculptured to represent a human foot (Plate XLV, Fig. 9). The pottery pipe bears a modeled geometric design. These attempts at decoration or symbolism are discussed under the subject of art on p. 223. One pipe (Plate XLV, Fig. 8) is of urn shape and of such artistic outline that it also is again mentioned there. As mentioned on p. 211, the pipes were probably used in ceremonial and religious ways.

Manufacture of Pipes made of Stone. The processes used in the manufacture of pipes and the life history of a pipe from the raw material to the finished object is somewhat illustrated by the specimens collected, especially those shown in Plates XLVI and XLVII. The cylinder of yellowish sandstone shown in Plate XLVI, Fig. 1, has a dot in one end, evidently intended for the beginning of the bowl. The specimens shown in Plate XLVI, Figs. 1–4 are evidently all unfinished simple bowl pipes of cylindrical or conoid form requiring simply to be drilled in the upper end for the bowl and provided with a small lateral perforation for the reception of the stem. The last of these is of limestone pecked into form, and has a drilling evidently the beginning of the bowl. The specimen shown in Fig. 5 in this plate was also pecked into form and the next one was pecked from limestone. The one shown in Fig. 7 of the same plate was apparently broken in process of manufacture. The broken pipe shown in Fig. 9 had drillings of conoid form for the bowl and stem, holes of which shape could have been made with a drill point chipped from stone (Cf. Plate XXXIII, Fig. 19), while the one illustrated in Fig. 12 has drillings of cylindrical form such as are made by drilling with a hollow drill resembling the modern diamond drill, possibly a hollow reed revolved between the palms or between a palm and a thigh was used, probably with some abrasive such as sand with water. Such a drill leaves a core like the one shown in the illustration. The specimens shown in Plate XLVII are all unfinished pipes of the elbow type, the third of reddish sandstone, the fourth of limestone, and the others of yellowish limestone, all of which were roughly pecked into form. The first is marked for the drilling which would form the bowl as is also the second which has been split longitudinally probably in the process of manufacture. The third has a drilling begun for both bowl and stem, while in the fourth

[1] Mills, (b), p. 59.
[2] Mills, (b), p. 17.
[3] Mills, (a), pp. 14, 28.

the bowl has been begun, but by pecking instead of by drilling. The object shown in Plate LI, Fig. 3, is possibly but not probably an unfinished pipe. The unfinished pipes of the Gartner site show that they were made first by pecking and then by rubbing, and that the bowl was drilled first.[1] It is possible that some of the beads (Plate XLVIII) and pendants (Plate XLIX) may have been attached to the pipes.

Amusements. The astragalus bone of the deer mentioned on p. 209 (Plate XLIII, Fig. 8) as possibly a die may have been used as a buzz, and the thin perforated object mentioned on p. 209 (Plate LIII, Fig. 3) may possibly have been part of a puzzle. The whistles mentioned on p. 212 may have been used for amusement.

Warfare.

A number of objects were mentioned on p. 184 as having possibly or probably been used in both warfare and hunting. It is quite possible that some of the objects considered as articles of personal adornment may have been used as charms attached to weapons for warfare. A large object made of limestone, possibly a war club was found in the Gartner Mound in Ohio.[2]

Dress and Adornment.

Some evidences relating to clothing materials, moccasins, hair spreaders, combs, and personal ornaments, such as beads, pendants, and discs were found. Personal ornaments were found in great numbers. They were made of stone, pottery, bone, teeth, and both fresh water and ocean shell. Under miscellaneous ornaments we consider evidences of ear and nose ornaments, necklaces, cut animal skulls, bracelets, rings, and pins. A few of the objects here considered may have been charms and were possibly used on weapons in warfare. Personal ornaments made of shell of the fresh water mussel and large and small ocean molluscs were found at the Gartner site.[3]

Clothing Materials. Skins of some of the animals mentioned on p. 181 et. seq. as represented by their bones, antlers, and teeth found in the refuse of this village site, such as the elk, deer, bear, wolf, red fox, lynx or wild cat, raccoon, opossum, beaver, mink, weasel, woodchuck, red or fox squir-

[1] Mills, (b), p. 59.
[2] Mills, (b), p. 14.
[3] Mills, (b), p. 53.

rel, and pack or wood rat may have furnished the material for clothing. The eagle, owl, great blue heron, wild turkey, and duck may have supplied feathers for costumes and even the turtle may have contributed useful material (p. 211). The impressions of netting and cord upon the pottery shown in Plate XXV, Figs. 1–3, and casts taken of the impressions which show still more clearly that the cord was twisted, prove that fibers, probably vegetable, were spun (p. 205) and it is possible that they were woven into dress fabrics although it seems probable that the skins of animals furnished the material for most of the clothing. Impressions of cloth show on a pot [1] found in the Gartner Mound. Fragments of charred fabrics woven from vegetable fiber were found at the Gartner site where impressions of such fabrics appear upon almost every fragment of pottery.[2] Cloth of open twine weave was found in the Adena Mound.[3] Little was found to indicate the costume worn here, there being no such find as that of the sculpture [1] human form [4] used as a tubular pipe, found in the Adena Mound, probably indicating the style of costume in that region. We found no mica here but that mineral used for a headdress was found by Mills in the Adena Mound.[5] The somewhat lenticular piece of shell shown in Plate L, Fig. 6, with a perforation in each end, may have been used as an ornament fastened on to the costume (p. 220).

The phalanx bones of the deer and elk (Plate XLIII, Figs. 4–7) may have been used for a rattling fringe on the costume.

Moccasins. Moccasins were probably made from the skins of the deer and elk and possibly some of the other animals above mentioned. The sculpture shown in Plate LII, Fig. 15, apparently represents at least one of the types of moccasins worn here. The turning up and puckering of the toe is shown, while the gathering of the buckskin over the instep is at least suggested by the two concentric lines in that region. It will be remembered that certain tribes of Indians, for instance, the Ojibway of Michigan, have made moccasins in this particular way down to within a decade.

Hair Spreaders. The bone object described on p. 205 and shown in Plate LIII, Fig. 3, may have been used with a short bone tube as a spreader for roached hair. Mills considers that the larger double pointed awls made of bone and antler found on the Gartner site and in graves may have been used as hair pins, since in burials they were invariably found directly below the skulls.[6]

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[1] Mills, (b), p. 22.
[2] Mills, (b), p. 53.
[3] Mills, (a), p. 11.
[4] Mills, (a), p. 28.
[5] Mills, (a), p. 11.
[6] Mills, (b), p. 48.

Combs. Although we found no object certainly used as a comb, the cut piece of antler shown in Plate XXXVI, Fig. 21, may be a fragment of one. Two comb-shaped objects[1] each with six teeth and made of rib bone, presumably of the elk, were found by Mills, in the Adena Mound side by side as if forming a twelve tooth comb.

Beads. A small number of the beads are made of pottery (Plate XLVIII, Fig. 1). They vary somewhat in size, but apparently were intended to be spherical in form. They were modeled in such a way as to form the perforations, rather than made by perforating the sphere of soft clay, or by drilling after it was fired.

Cylindrical objects made of sections of bird bones (Plate XLVIII, Figs. 2-11) were probably used for beads. Some are no longer than they are thick, others are at least four times as long as thick. Especially among the shorter bone beads we find the ends rounded, apparently by wear. A few like the specimen shown in Fig. 6 of this plate bear incised geometric decorations. One has irregular incised lines and gouged holes and across some of these holes the surface has been cut off, leaving a concave depression. Some of the beads may have formed bracelets, such as the one found by Mills,[2] in the Adena Mound where some were small disc-shaped beads[3] made of bone. Beads made of the wing bones of birds especially of the wild turkey were found everywhere in the Gartner site and are associated with almost every necklace taken from the graves.[4] Many bone tubes made from the wing bones of large birds were found in the site.[5]

The history of manufacture of one of these bone beads is suggested by some of the specimens found here, a few of which are shown in Plate XLII, Figs. 10-17. The first illustrates the natural tibia of a small mammal representative of many slender bones of mammals and birds found here; the last illustrates a chipped point made of jasper such as may have been used for cutting these bones and is representative of many such points chipped from stone found on this farm. The specimen shown in Fig. 11 of this plate is the same as the tibia at the first of the series but the distal end has been cut off. The next illustrates a piece of a long bone, and the next the end of the long bone of a quadruped from both of which the lower end has been cut like the preceding but these are also incised around a short distance above the end in process of removing the distal section for a bead. Fig. 15 shows the distal end of a humerus and Fig. 16 that of the metatar-

[1] Mills, (a), p. 24.
[2] Mills, (a), p. 15.
[3] Mills, (a), p. 20.
[4] Mills, (b), pp. 17-18, 56
[5] Mills, (b), p. 49.

sus of a deer from both of which a section probably for a bead has been cut. Fig. 14 shows such a section fully removed, that is, a bead finished except perhaps that the ends may have been rubbed smooth in some cases on a gritstone or worn smooth by actual use. The wing bone of the trumpeter swan from which the greater part had been cut away was found in the Gartner site.[1]

Some of the shell beads were cylindrical (Plate XLVIII, Figs. 12–18). A few (Plate XLVIII, Fig. 14) were disc-shaped and some were made of large pieces of ocean shell. Sometimes, as in the case of those shown in Figs. 19–20 and 24 of this plate, whole shells were used and were not much changed from the natural form, being merely perforated for suspension. Shell beads were very abundant in the Gartner site, sometimes seven to eight hundred being found with a skeleton. Most of them were made from ocean shells.[2] Beads made of ocean shells[3] were also found in the Gartner Mound. In the former at least they were from large shells. Shell beads were found in the Adena Mound.[4] Small ocean shells, natural except pierced with a hole for attachment (Plate XLVIII, Fig. 24) were found here as in the Gartner site.[5] A pearl bead (Plate L, Fig. 5) was found. Pearl beads were also found by Mills in the Adena Mound.[6]

Pendants. Pendants were made of stone, teeth, and shell (Plates XLVIII–L). The first seven figures in Plate XLIX show the range of forms of pendants made of stone. These are all of canal coal or carboniferous shale. The first is of claw shape, seems to be broken off at the base, has an incision across the upper surface near this broken end and on the reverse there is a perforation begun opposite this incision. The next is of lozenge shape, slightly convex on the reverse. This specimen has been perforated by drilling from each side. The third figure is perforated transversely by drilling from each side and is somewhat flattened on the reverse. While we could hardly say that this was shaped to imitate a canine tooth the pendants shown in Fig. 4 are probably intended to represent teeth or claws. They were found on the neck of skeleton 30 which suggests that they formed part of a necklace. The next two specimens somewhat resemble these while the seventh differs only in that there are small drilled pits on the sides and edges. The thin bone object shown in the eighth figure which has been mentioned on pp. 209 and 215 may possibly have been used as a pendant. Pendants were sometimes made of the teeth of at least three

[1] Mills, (b), p. 50.
[2] Mills, (b), p. 55.
[3] Mills, (b), pp. 14, 17, 54.
[4] Mills, (a), p. 16.
[5] Mills, (b), p. 54.
[6] Mills, (a), p. 28.

families of small carnivora (Plate XLIX, Fig. 9), the incisors of the elk (Plate XLIX, Fig. 10), and the canines of the wolf (Plate XLIX, Fig. 11), by perforating them through the root for suspension. Some of the wolf tooth pendants bear incised lines (Plate XLIX, Fig. 11; Plate LIII, Fig. 5). Pendants, each made by perforating the canine tooth of a mountain lion were found by Mills in the Adena Mound,[1] and as a necklace in the Gartner Mound.[2] Perforated canine teeth of the gray wolf used on a necklace and teeth of the dog, raccoon and wild cat used for pendants were also found in the latter.[3]

A pendant made by perforating the root of the canine tooth of an elk (Plate XXXVII, Fig. 9) was found in mound 2. While canine teeth of the elk, some perforated twice, were found in the Gartner site, they were rarely found in the graves of the Gartner Mound.[4] Incisors of the elk, perforated or grooved were found in the Gartner site.[5] The canine teeth of the black bear perforated through the base for suspension were frequently found here in Kentucky (Plate XLIX, Fig. 15). A few were grooved instead of being perforated, one of these is shown in the next figure. Fig. 17 shows a perforated specimen which has been flattened on one side. The next is flattened on the reverse while the obverse bears two parallel zigzag incised lines. On the left edge near the base is incised IIX. One old worn canine tooth of a bear which was found is apparently in process of manufacture into a pendant as a perforation is begun near its base. Pendants made of the canine teeth of the black bear perforated through the root were found in abundance in the Gartner site.[6] Pendants made from the digits of the wild turkey occur in great numbers particularly with the burials in the same site.[7] It is possible that the perforated phalanx bones mentioned on p. 209 (Plate XLIII, Figs. 5–7) may have been used for pendants. The claw of an eagle bearing incised lines, mentioned on p. 182 (Plate XVIII, Fig. 5) may have been used on a costume or necklace. Bear claws were found on the arm of a skeleton in the Adena Mound.[8]

Pendants of shell were numerous in the graves of the Fox Farm and there were several styles (Plate XLIX, Figs. 12–14; 19–25). The one shown in Fig. 13 may perhaps be considered as intended to represent a claw. Figs. 19 and 20 illustrate pendants that are crescent shaped. Crescents

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[1] Mills, (a), p. 24.
[2] Mills, (b), pp. 10, 21.
[3] Mills, (b), pp. 10, 18, 21.
[4] Mills, (b), pp. 20, 56
[5] Mills, (b), p. 56.
[6] Mills, (b), p. 57.
[7] Mills, (b), p. 56.
[8] Mills, (a), p. 26.

made of mussel shells were found at the neck of a skeleton in the Gartner Mound[1] and a crescent made of the outer whorl of an ocean shell was found in the same mound, while crescents made from shell were found in the village site.[2] Mills states that he has not been able to ascertain that they have been found in any great numbers at any other place in the vicinity, and in three seasons work at the Baum village he found none, although all other ornaments made of shell common to the Gartner site were found. The specimen shown in Fig. 21 is merely a natural shell with a perforation near the hinge. This perforation may have been accidentally made. The pendants shown in Figs. 23 and 24 were perhaps intended to be of tooth or claw shape. The one shown in Fig. 27 is also somewhat tooth-shaped. The next figure illustrates one of claw shape with incised lines and drilled dots while the next has a median longitudinal incised line and a transverse rather than a vertical perforation. Fig. 30 in this plate shows a long tooth-shaped pendant cut out of shell also with a transverse perforation. The next two pendants are somewhat similar but with vertical perforations. The specimens shown in Plate XLVIII, Figs. 19–21 may be considered as pendants instead of beads. They are but slightly changed from the natural form of the Olivella shell being only perforated while the next two specimens made from the same kind of shell have been cut out and perforated vertically through the upper end. Fig. 33 of Plate XLIX shows a pendant made of a Busycon shell slightly changed from its natural form. It is perforated for suspension. The next is grooved for suspension and most of the whorls of shell have been removed so that the pendant consists of but little more than the columella. The last figure in this plate shows a spoon-shaped pendant made of thin shell perforated at the narrow end. Pendants made from large ocean shells and of long strips or triangles, cut out of both fresh water and ocean shells but mostly from fresh water mussel shells were found in the Gartner site.[3]

The slate gorget (Plate L, Fig. 1) mentioned on p. 212 may have been a personal ornament rather than a religious object. The next specimen is a stone disc perforated at one edge and partly perforated from each side at the other. Some of the perforated stone discs mentioned on p. 210 (Plate XLIV, Fig. 4) may have been used for objects of personal adornment, and this seems even more likely of the perforated discs made from potsherds (Plate XLIII, Fig. 11). Probably those made of shell (Plate L, Figs. 5, 9–11, 13) were so used as they are small and decorative. The one shown in Fig. 5 has notches or scallops around the edge, bears an incised circle and

[1] Mills, (b), p. 14.
[2] Mills, (b), p. 54.
[3] Mills, (b), pp. 54, 55.

radiating lines, and a pearl bead is stuck to it apparently by the decomposed material of the surface of the shell. It was found near the clavicle of skeleton 92 in mound 2 and had perhaps been fastened to some garment by a string or thread passing through the perforation and the bead and then back again through the hole in the disc. A small shell gorget set with a fresh water pearl was found in the Gartner Mound.[1] The specimen shown in Fig. 7 has only one perforation. It was found on the right arm of skeleton 60 in mound 2. The elliptical shell object shown in Fig. 6 has two perforations, one at each foci. These were apparently drilled from each side. It may have been fastened to a garment. The one shown in Fig. 8 has notches around the edge and two holes. These were apparently drilled only from one side and are broken out on the other. The thin circular concavo-convex shell objects shown in Figs. 3 and 4 of this plate each have two perforations. On the concave surface the former has five drilled pits; the latter incised lines. Small circular gorgets, some made of fresh water mussels and some of ocean shells but identical in form with two holes in the edge and one on the middle, two probably for suspension, the other for the reception of a pearl were found in the Gartner site.[2] The specimens shown in Figs. 12, 14, and 15 of the same plate are somewhat the same in style, each having two perforations, but are much larger. The first is made of the large end of a busycon shell and was found at the head of skeleton 98 in mound 2. This is the only shell disc with two perforations at the edge and one large one in the center found by us, but it will be remembered that such specimens were frequently found in the Gartner Mound.[3] One of these is four inches in diameter, was made of conch shell and the central perforation is about half an inch in diameter. Many of them were made of mussel shells.[4] The next specimen shown, Fig. 14, is concavo-convex and was found at the chest of skeleton 155 in mound 6. The last is somewhat of pear shape, also concavo-convex and was found at the neck of skeleton 144 in mound 6. These remind us of the shell discs engraved with such conventional figures as those of the rattlesnake, spider, and human form in the act of throwing the discs found in other parts of the United States, including Illinois, Kentucky,[5] Tennessee, Georgia, Missouri, and also in Mexico. Gorgets made from large ocean shells were found in the Gartner site and Mills states that he found gorgets in the Adena Mound.[6] Some of the objects here

[1] Mills, (b), p. 8.
[2] Mills (b), p. 54.
[3] Mills, (b), pp. 8, 23.
[4] Mills, (b), p. 18.
[5] Holmes, (a), p. 97; (c), Plates LXI–LXVI; LXXI–LXXV.
[6] Mills, (b), p. 54; (a), pp. 14, 18.

considered as pendants, ornaments, or beads may have served as bait in fishing (p. 188).

Miscellaneous Ornaments. The fragments of pottery objects of spool shape, shown in Plate LI, Figs. 1–2, resemble the copper ear ornaments common in Southern Ohio. Ear ornaments were probably worn in the vicinity of the Adena Mound as they are indicated on the sculptured human form used as a tubular pipe found by Mills and as spool-shaped copper objects of similar shape are frequently found in other parts of the Scioto Valley.[1] The antler, bone, and shell cylinders shown in Plates XLIII, Figs. 1–3; LI, Fig. 15; L, Fig. 16, may have been ear or nose ornaments or made into chest shields of the form made up of long biconical shell tubes such as have recently been used by the Dakota Indians. Necklaces were probably made here of bone and shell beads with pendants of canine teeth and incisors of the elk as all these objects were found here and such necklaces were found in the Gartner site.[2] Part of the jaw of a bear, cut off through the roots of the teeth (Plate LI, Fig. 7) was found near the legs of skeleton 61 in mound 2 and another (Plate LI, Fig. 8) was found near the skull of the same skeleton. Cut bear teeth were found in the Gartner mound.[3] The cut left ramus of the deer which Mills believes to be an ornament in process of manufacture but which may have been a corn scraper found in the Gartner site and cut jaws of the gray wolf, which he believed were also used as ornaments were found throughout that site but not in the graves. The cut ramus of a wild cat was also found there. The cut skull of a dog with the top and jaws notched possibly to fasten them together was found in the Gartner site but none were found in the graves. A cut skull of a mink with the top of the skull and jaws notched possibly to fasten them together was found in the Gartner village site. Such cut skulls were not found in the graves.[4]

No copper bracelets were recognized here although some of the beads may have been strung as bracelets and it will be remembered that Mills secured copper bracelets[5] in the Adena Mound and with an adult male skeleton in the same mound a bracelet made of bone beads was found.[6] No finger rings were found here but copper rings were found by Mills in the Adena Mound.[7] Double pointed objects considered by Mills as pins were found in the Gartner site.[8]

[1] Mills, (a), p. 28.
[2] Mills, (b), p. 56.
[3] Mills, (b), p. 17.
[4] Mills, (b), p 58; (c), p. 78.
[5] Mills, (a), pp. 10, 13.
[6] Mills, (a), p. 15.
[7] Mills, (a), p. 11.
[8] Mills, (b), p. 48.

Art.

The graphic and plastic art of the prehistoric people of the Fox Farm is illustrated by many objects (Plates LII–LIV), some of stone, bone, shell and pottery, and consists of engraving, notching, modeling, impressing, sculpturing, and painting.

There are many engravings on stone (Plate LII, Figs. 1–13) One specimen of yellowish gray sandstone bears parallel incisions on one side and two sets of such incisions form diamond-shaped hachure on the other. Incised lines occur on a platform pipe of greenish argillite found in the Gartner site [1] and on a stone pipe found in the Mound.[2] A few of the bone objects (Plate LIII, Fig. 2), several teeth (Plate XLIX, Fig. 18; Plate LIII, Figs. 5–7), and shell pendants (Plate LIII, Figs. 9–10) were engraved. Incised lines cut crosswise ornamented the concave surface of the canine teeth of the gray wolf and mountain lion in the Gartner Mound.[3] Engraving upon pottery (Plates LVII–LIX) was apparently done before firing. The handles of the larger vessels at the Gartner village site were invariably ornamented with incised lines.[4] Notching on some of the stone objects (Plate LII, Fig. 7; Plate XXXVII, Fig. 2), bone awls (Plate XXXIV, Figs. 4, 7; Plate LIII, Fig. 1), and shell objects (Plate L, Figs. 5, 8; Plate LIII, Fig. 8) may have been done for aesthetic reasons. Notches ornament some of the awls made from the tarsometatarsus of the wild turkey found in the Gartner site.[5] In this class may be mentioned the pits drilled in the perforated stone discs (Plate LII, Figs 5–6), pits in the claw-shaped stone pendant (Plate XLIX, Fig. 7), in a spatulate bone object (Plate LIII, Fig. 4), in a shell pendant which is also of claw shape (Plate LIII, Fig. 10), and the drilled holes through the pendant made of bone (Plate LIII, Fig. 3). Impressions of finger tips and nails (Plate LV, Figs. 1–9) and of paddles carved or wrapped with cord or netting (Plate XXV, Figs. 2, 3, 6), impressions of what appears to be a pit (Plate LV, Fig. 11), and modeled lines (Plate LVI, Figs. 8–10) were all made on pottery before firing, as were the modeled points regularly arranged (Plate LVI, Figs. 3, 4, 7; Plate LIV, Fig. 1), pressed notches (Plate LVI, Figs. 1–2), and ridges incised (Plate LVI, Figs. 5–6) and a knob with central depression (Plate LIV, Fig. 1). The impressions of carved and cord and netting wrapped paddles upon pottery were probably incidental to manufacture or to roughen the surface for practical reasons rather than

[1] Mills, (b), p. 59.
[2] Mills, (b), p. 18.
[3] Mills, (b), p. 21.
[4] Mills, (b), p. 36.
[5] Mills, (b), p. 47.

intended to beautify the pottery although the latter purpose may have been partly or wholly in the mind of the maker. Dots were pecked into the soft clay of the field bearing the sculpture of an animal (Plate LIV, Fig. 9) and into the animal's back, as well as to indicate its eyes, before the clay was fired for pottery. Decorations consisting of indentations of a blunt tool and others made with a reed or hollow instrument were seen on the ordinary potsherds and invariably on the handles of the larger vessels found at the Gartner village site.[1]

A piece of yellowish sandstone bearing grooves on the reverse was sculptured to represent the human face (Plate LII, Fig. 14) and another piece (Plate LII, Fig. 15) represents a moccasin (p. 213). We found no sculptured pieces of bone and shell, but a sculptured fox head forming the basal end of a large awl was found in the Gartner Mound [2] and a sculptured figure of a raccoon made of shell was found in the Adena Mound.[3] Modeled animal forms and handles on pottery (Plate LIV, Figs. 3–10, Plates XXVI–XXX) especially the latter were common. Figs. 3 to 7 in Plate LIV apparently represent duck heads and were all broken from the edges of dishes. The next specimen is a crude representation of the human face on a pot lug and another such lug was found in the general diggings of mound 1. A sculptured human form made of clay and used as a tubular pipe was found by Mills in the Adena Mound.[4] Fig. 9 of the same plate apparently represents a lizard. The effigy of a lizard, according to Mills, decorated a potsherd found in the Gartner village site.[5] The next fragment apparently represents the head and back of a fish.

A single example of line painting was found on a fragment of pottery (Plate LIV, Fig. 11). It is dark red in color and of crude technique. Some of the human bones in the Adena Mound of Ohio were painted red according to Mills.[6] The shear form of one of the pipes (Plate LIV, Fig. 12) and of some of the pottery vessels as indicated by fragments, is of a rather artistic nature.

There are realistic representations, conventionalized figures, pictographic markings, and geometric patterns, some of the last of which may be merely decorative and not at all representative. Of realistic art, the engraved animal forms (Plate LII, Figs. 8, 9; Fig 1c), incised human faces (Plate LII, Figs. 10–12), sculptured face (Plate LII, Fig. 14), incised human form (Plate LII, Fig. 13), and sculptured foot (Plate LII, Fig. 15) are all in

[1] Mills, (b), p. 36.
[2] Mills, (a), p. 27.
[3] Mills, (b), p. 16.
[4] Mills, (a), p. 28.
[5] Mills, (b), p. 36.
[6] Mills, (a), p. 22.

stone and the duck or bird heads (Plate LIV, Figs. 3–7), the human faces on pot lugs (Plate LIV, Fig. 8), lizard (Plate LIV, Fig. 9), and fish (Plate LIV, Fig. 10) are in pottery. Some of these may also be considered as conventional. Of pictographic markings there are the incised animal forms and scratches on stone (Plate LII, Fig. 8). Among geometric forms there are the incised lines and lines arranged with dots on the stone discs (Plate LII,

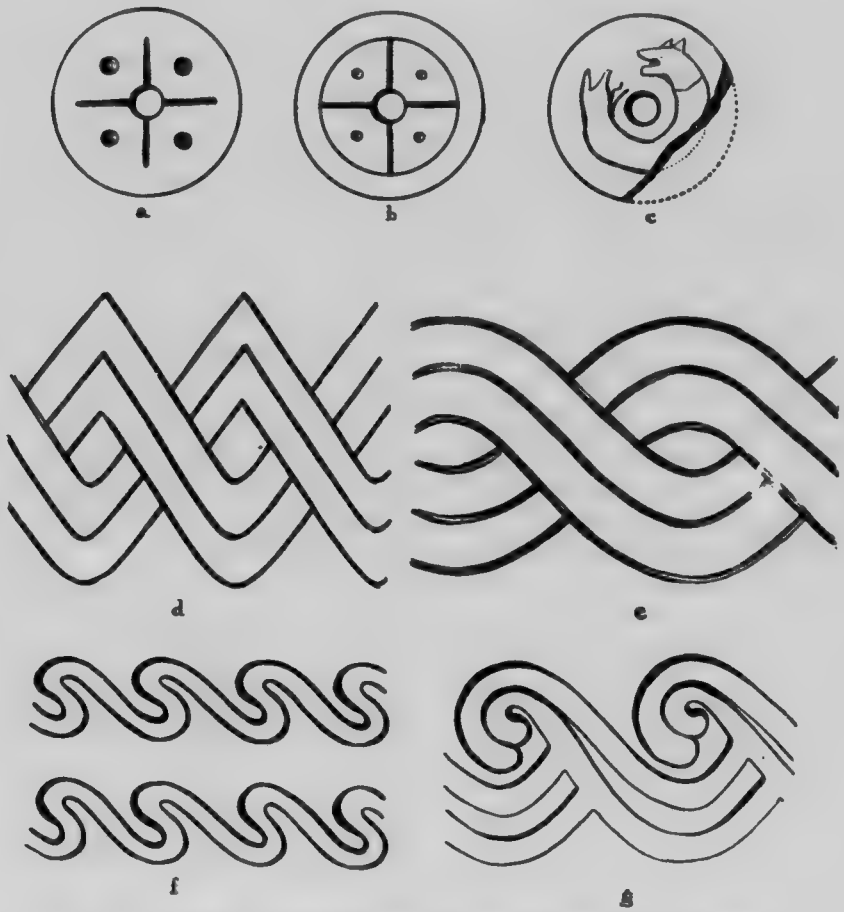

Fig. 1. Designs on Certain Stone and Pottery Objects. ½ nat. size.

Figs. 4–6), and the incised designs (Plates LVII–LIX), the regularly arranged nipples (Plate LVI, Figs. 3–4, 7; Plate LIV, Fig. 1), pressed notches (Plate LVI, Figs. 1–2), and notches incised in ridges (Plate LVI, Figs. 5–7) all on the pottery as well as impressed depressions (Plate LV) and scrolls (Plate LVI, Figs. 8–10) on the same material. Incised lines in the form of a scroll decorated and encircled the upper portion of the bowl of a pot found in

the Gartner Mound.[1] Below the scroll are two incised lines running around the vessel. The incised XIII X and IIXII on pendants made of the canine teeth of the wolf and IIIXIII on the canine tooth of a bear (Plate LIII, Figs. 5–7) found on the Fox Farm may also be considered as geometric.

Whether the geometric designs on some of the stone discs (Plate LII, Figs. 4–6) and realistic pictographs (Plate LII, Fig. 9) were used for decorative or for symbolic purposes or both is conjectural. The animal figures scratched on stone (Plate LII, Figs. 8, 9) and modeled in pottery (Plate LIV, Figs 3–10) may represent the manitous of the maker or owner (p. 221).

The technique of some of the incised geometric designs on stone (Plate LII, Figs. 5–6), bone (Plate LIII, Fig. 4), and shell (Plate LIII, Figs. 9–10) especially on the stone objects, is good. Some of the geometric designs on stone (Figs. 1a, 1b) and modeled in pottery are of excellent patterns (Fig. 1d–g) but the execution is crude; that of the realistic pictographic sketches incised on stone (Plate LII, Figs. 8–9 and Fig. 1c) is inferior to the geometric designs (Plate LII, Figs. 4–6). The modeled animal heads (Plate LIV, Figs. 3–8) are crude. It will be remembered that shell discs much more artistically and elaborately carved than anything seen by us from the Fox Farm have been found in this general region (p. 220).

In art and technique the material found here is practically identical with that collected from the Madisonville Prehistoric Cemetery of Ohio, by Prof. Frederick W. Putnam, Dr. Charles L. Metz, Prof. M. H. Saville, myself, and others who have explored there in later years, as it is with that from the village sites of Fort Ancient, Oregonia, the Adena Mound, the Gartner village site and Mound, the Baum Prehistoric village site and the Robert Harness Mound all also of Ohio. In the Robert Harness Mound, however, Mills also found intrusive material of the Hopewell culture and the Edwin Harness group was of the Hopewell Culture.[2]

Injuries and Diseases.

Many of the skeletons show that the people suffered from injuries such as wounds and fractures as well as exceedingly from one or more painful bone diseases.

Scalp Cuts. A skull found in grave 195 bears a line of short and more or less parallel cuts across the frontal and right parietal. These may have been caused by scalping after, or immediately before death, at least the

[1] Mills, (b), p. 22.
[2] Mills, (d), p. 83.

individual did not live long enough for perceptible inflammation or repair of the bone to take place.

Arrow Wounds. Examples of arrow wounds were found. Two lumbar vertebrae from skeleton 179 each show a wound caused by a slender arrow point chipped out of chert the broken tip of which was found between them. The heel bone of skeleton 132 has imbedded in it a fragment of a slender arrow point chipped out of chert. The arrow point had been shot in from the rear and broken off so that the projecting part was not discovered until the bone was washed.

Fractures. A unique example of the fracture and repair of the middle of the shaft of the left ulna and a new joint formation between the head of the radius and the distal end of the humerus was found in skeleton 185, probably of an adult, and has been described by Hrdlička.[1] The hooked proximal end of the ulna probably held that bone in place at the elbow and caused it to break when it received the injury that brought about this condition, while the head of the radius being more easily dislocated was torn out of position and consequently the shaft was not broken. As repair took place, the proximity of the fractured terminal segment of the ulna to the adjacent portion of the radius which was probably injured by it, caused the union of the broken parts of the ulna and a bridge connecting this junction with the adjacent part of the radius. This would prevent the turning of the left forearm.

A new free joint-formation took place between the head of the dislocated radius and a bony process probably an ossified attachment projecting from above the articular surface of the distal end of the apparently normal and uninjured humerus. The process ends in an articular socket. Its distal two thirds are free from the humerus. Hrdlička states that the process no doubt was covered with synovium. The head of the radius underwent no change unless it may have been a very slight lengthening. This supports the probability that the bones at the time of fracture and dislocation were those of a fully developed adult. The cause of the new process was probably a moderate injury either to the ligaments or the periosteum of the distal end of the humerus. This could only have taken place while the elbow was held comparatively motionless and resulted in the practical immobility of the elbow joint. Hrdlička states that such formations are extremely rare in man and that he has been unable to find a similar case described. Regeneration of bone, to which the process is related, is much more frequent in lower animals than in man. Another example of repaired fracture may be seen in the right clavicle of skeleton 132 found in mound 3.

[1] Hrdlička, p. 550.

Diseased Individuals. Ninety-nine well-preserved and nearly complete skeletons out of those found in the two hundred and eight graves explored were selected for examination without regard for their normal or pathological character. The missing bones of incomplete skeletons might or might not be pathological and consequently incomplete skeletons were not used in obtaining the following results:

19 or 19 + % of the 99 were pathological.
0 " 0 % " " 24 children were pathological.
3 " 15 % " " 20 youths were pathological.
9 " 27 + % " " 33 men were pathological.
7 " 31 + % " " 22 women were pathological.
16 " 29 % " " 55 adults were pathological.

Bones Diseased. The portion of the body most affected is indicated by the following table:

Out of 20 pathological individuals the skull in 4 or 20% of the cases was pathological.
An arm bone in 9 or 45% of the cases was pathological.
The humerus in 5 or 25% of the cases was pathological.
The lower arm in 4 or 20% of the cases was pathological.
A leg bone or bones in 12 or 60% of the cases was pathological.
The femur in 4 or 20% of the cases was pathological.
The lower leg in 11 or 55% of the cases was pathological.
A vertebrae in 6 or 30% of the cases was pathological.

From this it is seen that the pathological condition is widely distributed but that the lower leg presents the most frequent and extensive cases.

The distribution of the pathological bones in the bodies of the individuals is indicated by the following statement:

Out of twenty individuals, all pathological.

9 or 45% were affected in one region of the body only.
6 or 30% " " " two regions of the body only.
2 or 10% " " " three regions of the body only.
2 or 10% " " " four regions of the body only.
1 or 5% " " " five regions of the body only. Not counting four of the twenty that were diseased in the vertebrae only, out of sixteen.

5 or 30% were affected in one region of the body only.
6 or 36% " " " two regions of the body only.
2 or 12% " " " three regions of the body only.
2 or 12% " " " four regions of the body only.
1 or 6% " " " five regions of the body only.

From this it is seen that the number of individuals having the pathological condition varies inversely with the number of regions affected, and suggests that as the condition became intensified it spread to various parts of the body.

Identification of Disease. The identification of the disease, or diseases, which caused these lesions of the bone have not been made, although the bones have been examined by a number of medical men. Dr. T. Mitchell Prudden among others who examined them informed me that attempts at identification from such bones are very unsatisfactory. It has been suggested that these lesions may be tubercular, rheumatic, or syphilitic but, in an endeavor to ascertain if they might not be due to some other cause, suggested by Dr. Prudden, I made an approximate identification of the sex of each pathological skeleton, and allowing for error, found that apparently nearly equal numbers of males and females were affected with an approximately equal distribution over the body. As it seems likely that the males would receive more wounds, especially in battle, than the females, this seems to suggest that the condition was not caused by neglected wounds but rather by some disease such as one or more of those previously mentioned. Thus no relation between sex and pathological condition was found, similar bones in each being affected with about equal severity and frequency.

Longevity. The ages of the individuals at the time of death varied from infancy to old age. There were found many skeletons of infants. Among the well-preserved skeletons, which of course may not indicate the exact normal number of deaths because skeletons of certain ages may resist decomposition longer than others, be buried under conditions bringing about the same result or precluding our finding a normal proportion of them, it may be seen that the distribution of deaths in ninety-nine carefully selected cases was twenty-four children, twenty youths, and fifty-five adults (thirty-three men and twenty-two women).

Method of Burial.

Mounds. The dead were deposited in the ground in graves many of which were grouped, each group being covered by a low dome-shaped mound, one of which is shown in Plate XL, Fig. 1. The graves were often close to each other. Plate LXI shows their relative distribution in the mounds, while in Fig. 2 of this plate it may be seen that they were at various depths. Other graves were found near these mounds and it is quite pos-

sible that they were in mounds, long since reduced by many years of cultivation. Skeletons were found at various depths in the Adena Mound and rude sepulchers made of unhewn logs were indicated by molds in the soil.[1] Calcined human bones found in that mound were interpreted by Mills as proof that the body had been cremated.[2] He also states that the soil from which the Gartner Mound of Ohio was made had evidently been collected from the village site and that in every portion of the mound various implements and ornaments were found intermingled with the soil.[3] One burial there was considered intrusive but the burials in two sections were in every portion and even below the base while in one section the bodies had been cremated and the ashes, personal belongings, and unburned animal bones had been deposited upon a level clay floor.[4] The majority of the dead at the Gartner site were cremated and placed in the mound. No cremated remains or evidences of cremation were found outside the mound.[5]

"*Altars.*" Near the center of mound 1 was a so-called "altar" consisting of a saucer-shaped hollow about eighteen inches in diameter in the clay floor of the mound (Plate LX, Fig. 2). The floor was burned to the consistency of soft brick for some distance around the basin which was filled with ashes. A similar "altar" was found in the camp trench.

Graves. Some of the skeletons both in and out of the mounds were simply in the ground covered with refuse and soil (Plate LXI, Fig. 1), others had limestone slabs laid crosswise over them at a distance averaging perhaps one foot above the skeleton and one foot below the surface of the soil (Plate LXII, Fig. 1), except in the mounds, where the depth was often greater (Plate LXI, Fig. 2). Still other skeletons in addition to having these flat covering slabs had slabs along the sides and ends (Plate LXIII, Fig. 1) and one skeleton (Plate LXIII, Fig. 2) also had a pavement of these stones below it. In some cases where there were side and end stones, there were no covering slabs, but this was probably due to the fact that plowing had disturbed them. A grave with stone slabs at the head and foot supporting a longitudinal cover of logs indicated by molds in the soil was found by Mills in the Adena Mound. A layer of bark was found covering the bottom of a grave in the same mound and bark was found covering some of the burials.[6] Burials of the Gartner village were similar in every respect to those of the Baum site. Each family apparently had its own burial place near its home.[7]

[1] Mills, (a), pp. 7, 20.
[2] Mills, (a), p. 25.
[3] Mills, (b), p. 6.
[4] Mills, (b), pp. 6, 16.
[5] Mills, (b), p. 62.
[6] Mills, (a), pp. 16, 21.
[7] Mills, (b), p. 60.

Position of the Skeleton. There seems to have been no particular position for burial, for the skeletons were found lying in different directions (Plate LXI, Fig. 2). They were all placed upon the back, however, sometimes with the arms along the sides (Plate LXII, Fig. 2; Plate LXIII, Fig. 2). Often the legs were flexed, usually to the right or left (Plate LXI, Fig. 2), but in one case they were found with the knees elevated. This suggests that possibly all of the flexed burials were made in this position and during the decay of the body the knees fell to one side or the other. In one case, as shown in the middle skeleton in Plate LXI, Fig. 1, the forearms were flexed so that the hands were at the shoulders. At the Baum and Gartner sites the majority of the skeletons were found at full length,[1] but some of those found in the Gartner mound had the knees flexed to the right; while in the Gartner village site one skeleton was flexed to conform to the size of the refuse pit in which it was found.[2] A headless skeleton was found in the Gartner Mound.[3]

Plural and Bundle Burials. In a number of cases, more than one skeleton was found in the same grave. Usually, one was in anatomical order (Plate LXIV, Fig. 2) and the other skeleton or skeletons were bundled over it (Plate LXIV, Fig. 1). A double burial in which the skeletons were in order and at length, that of an aged couple, was found at the Gartner site [4] and double burials were found in the Adena Mound, the two skeletons being parallel but the head of one at the feet of the other.[5] I found a stone grave burial of this kind on a hill top of the Hayner Farm north of the Little Miami River between Morrow and South Lebanon while carrying on explorations for the World's Columbian Exposition in 1892. A skeleton found crosswise over the feet of another in a sepulcher in the Adena Mound of Ohio suggested to Mills the possibility that it was a human sacrifice.[6] A skeleton found by Mills in the Adena Mound suggested that the body had been first placed in another place and later transferred to the Mound as the bones were not in anatomical order [7] but there was no evidence that the bodies were first placed on scaffolds and afterwards interred at the Baum and Gartner sites.[8] The finding of burials in the refuse pits of the Baum site [9] suggests that they were intended as temporary interments. If such burials were reinterred with a later one, the bones might be found disar-

[1] Mills, (b), p. 61.
[2] Mills, (b), pp. 25, 61.
[3] Mills, (b), p. 17.
[4] Mills, (b), p. 61.
[5] Mills, (a), p. 14.
[6] Mills, (a), p. 25.
[7] Mills, (a), p. 16.
[8] Mills, (b), p. 61.
[9] Mills, (c), p. 84.

ranged as in a burial at the Adena Mound[1] and in some of the double burials found here in Kentucky.

Artifacts in Graves. Objects were nearly always found with the skeletons. Ornaments and beads only were with some of the skeletons of children. Artifacts were so very numerous in the village site and mounds that some of them were found in the soil of the graves. This may account for the presence of objects with some of the skeletons. A pottery bowl with a unio shell, concave side down, in the bottom was found in grave 205 on the left chest of the skeleton of a child. Artifacts were found with some and not with other burials in the Adena Mound.[2] Mills considers some of the animal bones found in this mound to be the remains of a sacrifice made near a grave and afterwards deposited over it.[3] Implements and ornaments were placed with the bodies buried at full length in the Baum and Gartner sites[4] and objects were found with some skeletons and not with others in the Gartner mound.[5]

Conclusion.

The material culture of this prehistoric site in Kentucky may here be briefly characterized. A variety of the animals and plants of the region were used for food. Some of these animals though historically known in the state are now extinct in the vicinity. Bones, antler, teeth, shell, and vegetable substances were used as material for weapons, tools, and other manufactures. Among objects used in securing food by means of hunting and fishing, projectile points were made by chipping stone and by shaping antler tips. Fish hooks of bone and nets were made. Local shells were used in a way that smoothed and sharpened the edge. Chipped discs of limestone were common. Among tools supposed to have been used by men were many celts pecked and polished from stone but a few were chipped from stone and several were cut out of antler. There were hammerstones made of pebbles and whetstones of sandstone. The pitted stone also occurred here. Beaver teeth supposed to have been used for knife points were found, knives and drills were chipped out of stone, and the hollow cylindrical drill is known to have been used. Among tools t[illegible] to have been employed by women are scrapers chipped from stor[illegible]

[1] Mills, (a), p. 16.
[2] Mills, (a), p. 8.
[3] Mills, (a), p. 25.
[4] Mills, (b), p. 61.
[5] Mills, (b), p. 21

bone, and awls, many of them made of ulnae of various animals and of turkey bones. A few needles were also found. The people worked by rubbing or grinding, polishing, cutting, drilling, punching, chipping, flaking, pecking, modeling, impressing, twisting, knitting, and painting. Many discs made of stone and potsherds, most of them being perforated in the center, that may have been used in games were found. Fragments of pottery showed that the people of the site were proficient in its manufacture. Besides cooking pots, pipes, and beads were made of pottery. The pottery found here belongs to the Ohio Valley group and differs from some of that of Western Kentucky which belongs to the middle Mississippi Valley group.[1] It was decorated in various ways, especially with incised designs, impressions, and sculptured animal heads, while many pieces had handles or lugs. The lugs varied greatly in size and shape. No mortars or pestles were found here. Pipes made of stone were abundant and one of pottery was found. The people were fond of personal adornment and used beads of pottery, bone, and shell, also pendants of stone, teeth, and shell, and ornaments, many of them more or less circular in form and perforated for suspension, some were of stone, many of shell. The people decorated many of the things they made, especially by incising, notching, and modeling. They made both geometric designs and realistic representations. Some of the latter were incised, others were modeled. These represented lower animals and the human form. The people suffered from wounds and injuries besides greatly from a terrible disease which affected the bones of both sexes in many cases in all regions of the body. They buried the dead, both at length and flexed, in graves, some of which were grouped and covered with large mounds. Some bodies were more or less surrounded by limestone slabs forming what are called "stone graves." Artifacts were buried with the dead and double burials were made. The people were somewhat agricultural as is shown by the presence of corn and beans, and in this respect resemble those of the Gartner and Baum sites.[2] Intertribal trade or gifts, conquest or extended journeys, are indicated by ocean shells, here as they are by mica and ocean shell in the Gartner site.[3] Nothing of copper or obsidian was found.

The inhabitants of the village site were apparently the builders of the mounds as indicated by the similarity of the artifacts found in each. It will be remembered that the inhabitants of the Gartner village were the builders of the mound there.[4] Shell crescents were found here in Kentucky and it

[1] Holmes, (b), p. 182, Plate IV. Middle Mississippi Valley pottery is found even further east than here.
[2] Mills, (b), p. 65.
[3] Mills, (b), p. 65.
[4] Mills, (b), p. 63.

will be remembered that Mills states that the Baum site differs from the Gartner site only in the absence of shell crescents.[1]

The material culture of this site in Kentucky resembles that of the Adena Mound, Baum[2] and Gartner sites, the main or early part of the Robert Harness Mound, and the Oregonia, Fort Ancient, and Madisonville sites of Ohio. It belongs to what Mills has termed the "Fort Ancient Culture"[3] as different from the Hopewell culture (the Upper Mississippi pottery area) or the Northwest group described by Holmes[4] common to the Turner, Hopewell (North Fork or Clark) and the Edwin Harness groups and Siep Mound.[5] There are many remains both on the surface and in the soil of the village site, mounds, and graves while in the sites of Hopewell culture remains are comparatively scarce until a deposit is found. The pottery is of the poor type which Holmes has stated belongs to the archaic northern division of the art, rather than to the more highly developed southern pottery.[6] Although the pottery found here and on other sites of Fort Ancient culture is of the Ohio Valley type, yet the distribution of Ohio Valley pottery and that of other classes of cultural remains of the Ohio Valley pottery province is yet to be correlated.[7] The Fort Ancient culture, which, as Moorehead[8] states, is not yet definitely placed, is now known to be found at least here in Kentucky, as well as in Ohio.

[1] Mills, (b), p. 65.
[2] Cf. Mills, (c), p. 95.
[3] Mills, (d), p. 83; Holmes, (b), p. 182.
[4] Holmes, (b), p. 193.
[5] Mills, (e), p. 56.
Holmes, (b), pp. 183, 186.
[7] Cf. Holmes, (b), p. 187.
[8] Moorehead, p. 143.

BIBLIOGRAPHY.

BOAS, FRANZ. The Eskimo of Baffin Land and Hudson Bay. (Bulletin, American Museum of Natural History, Vol. 15, Parts 1 and 2, New York, 1907).

CULIN, STEWART. Games of the North American Indians. (24th Annual Report, Bureau of American Ethnology, 1902–3, pp. 5–846, Washington, 1907).

HOLMES, W. H. (a) Shell Ornaments from Kentucky and Mexico. (Smithsonian Miscellaneous Collections, Quarterly Issue, Vol. 45, Washington, 1903).

(b) Aboriginal Pottery of the Eastern United States. (20th Annual Report, Bureau of American Ethnology, 1898–99, Washington, 1903).

(c) Art in Shell of the Ancient Americans. (2nd Annual Report, Bureau of Ethnology, 1880–81, pp. 179–305, Washington, 1883).

HRDLIČKA, ALEŠ. A New Joint-Formation. (American Anthropologist, N. S., Vol. 1, No. 3, pp. 550–551, July, 1899).

MILLS, WILLIAM C. (a) Excavations of the Adena Mound. Certain Mounds and Village Sites in Ohio, Vol. 1, Part. 1. (Reprint from the Ohio Archaeological and Historical Quarterly, Vol. X, No. 4, Columbus, 1902).

(b) Explorations of the Gartner Mound and Village Site. Certain Mounds and Village Sites in Ohio, Vol. 1, Part 2. (Reprint from the Ohio Archaeological and Historical Quarterly, Vol. XIII, No. 2, Columbus, 1904).

(c) Explorations of the Baum Prehistoric Village Site. Certain Mounds and Village Sites in Ohio, Vol. 1, Part 3. (Reprint from the Ohio Archaeological and Historical Quarterly, Vol. XV, No. 1, Columbus, 1906).

(d) Explorations of the Edwin Harness Mound. Certain Mounds and Village Sites in Ohio, Vol. 1, Part 4. (Reprint from the Ohio Archaeological and Historical Quarterly, Vol. XVI, No. 2, Columbus, 1907).

(e) Explorations of the Seip Mound. Certain Mounds and Village Sites in Ohio, Vol. 2, Part 1, Columbus, 1909.

MOOREHEAD, WARREN K. A Study of Primitive Culture in Ohio. Putnam Anniversary Volume, p. 137, New York, 1909.

PUTNAM F. W. (a) The Way Bone Fishhooks were made in the Little Miami Valley, (20th Report Peabody Museum, 1886, Vol. 3, No. 7, p. 581, Cambridge, 1887).

(b) The Marriott Mound No. 1 and its Contents. Explorations in Ohio. (18th and 19th Annual Report, Peabody Museum, Vol. 3, Nos. 5 and 6, pp. 449–466, Cambridge, 1886).

SKINNER, ALANSON. The Lenapé Indians of Staten Island. (Anthropological Papers, American Museum of Natural History, Vol. 3, pp. 3–62).

SMITH, HARLAN I. (a) The Archaeology of Lytton, British Columbia. (Memoir, American Museum of Natural History, Vol. 2, Part 3, New York, 1899).

(b) Archaeology of the Thompson River Region. (Memoir, American Museum of Natural History, Vol. 2, Part 6, New York, 1900).

(c) Shell-Heaps of the Lower Fraser River. (Memoir, American Museum of Natural History, Vol. 4, Part 4, New York, 1903).

(d) Archaeology of the Gulf of Georgia and Puget Sound. (Memoir, American Museum of Natural History, Vol. 4, Part 6, New York, 1907).

(e) The Ethnological Arrangement of Archaeological Material. (Report, Museums Association of the United Kingdom for 1898, Glasgow, 1899).

(f) Certain Shamanistic Ceremonies among the Ojibways. (American Antiquarian, Vol. 18, pp. 282–284, September, 1896).

SWAN, JAMES G. Indians of Cape Flattery. (Smithsonian Contributions to Knowledge, Vol. 16, Article 8, Washington, 1870).

TEIT, JAMES. The Thompson Indians of British Columbia. (Memoir, American Museum of Natural History, Vol. 2, Part 4, New York, 1900).

THOMAS, CYRUS. Catalogue of Prehistoric Works East of the Rocky Mountains. (Bulletin No. 12, Bureau of American Ethnology, Washington, 1891).

WILLOUGHBY, CHARLES C. Antler-Pointed Arrows of the Southeastern Indians. (American Anthropologist, N. S., Vol. 3, pp. 431–437, New York, 1901).

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PLATE XVII. RESOURCES — ANIMAL MATERIALS.

From general diggings of mound 1.

Fig. 1 (20-289). Left half of the lower jaw of a black bear.
Fig. 2 (20-292). Right half of the lower jaw of a Virginia deer.
Fig. 3 (20-290). Right half of the lower jaw of an elk.
Fig. 4 (20-305). Skull of a raccoon.
Fig. 5 (20-304). Skull of a red fox.

Resources — Animal Materials.

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PLATE XVIII. RESOURCES — ANIMAL MATERIALS.

Fig. 1 (20–1176). Lower mandible of a great blue heron. From general diggings pump trench.

Fig. 2 (20–350). Right tarsometatarsus of a wild turkey. From general diggings of mound 1.

Fig. 3 (20–749). Ilium of a duck. From general diggings of mound 2.

Fig. 4 (20–372). Clavicle of an owl. From general diggings of mound 1.

Fig. 5 (20–396). Phalanx of an eagle bearing incised lines. From general diggings of mound 1.

Fig. 6 (20–746). Left half of the lower jaw of a lynx or wild cat. From general diggings of mound 2.

Fig. 7 (20–306). Right half of the lower jaw of an opossum. From general diggings of mound 1.

Fig. 8 (20–307). Right half of the lower jaw of a woodchuck. From general diggings of mound 1.

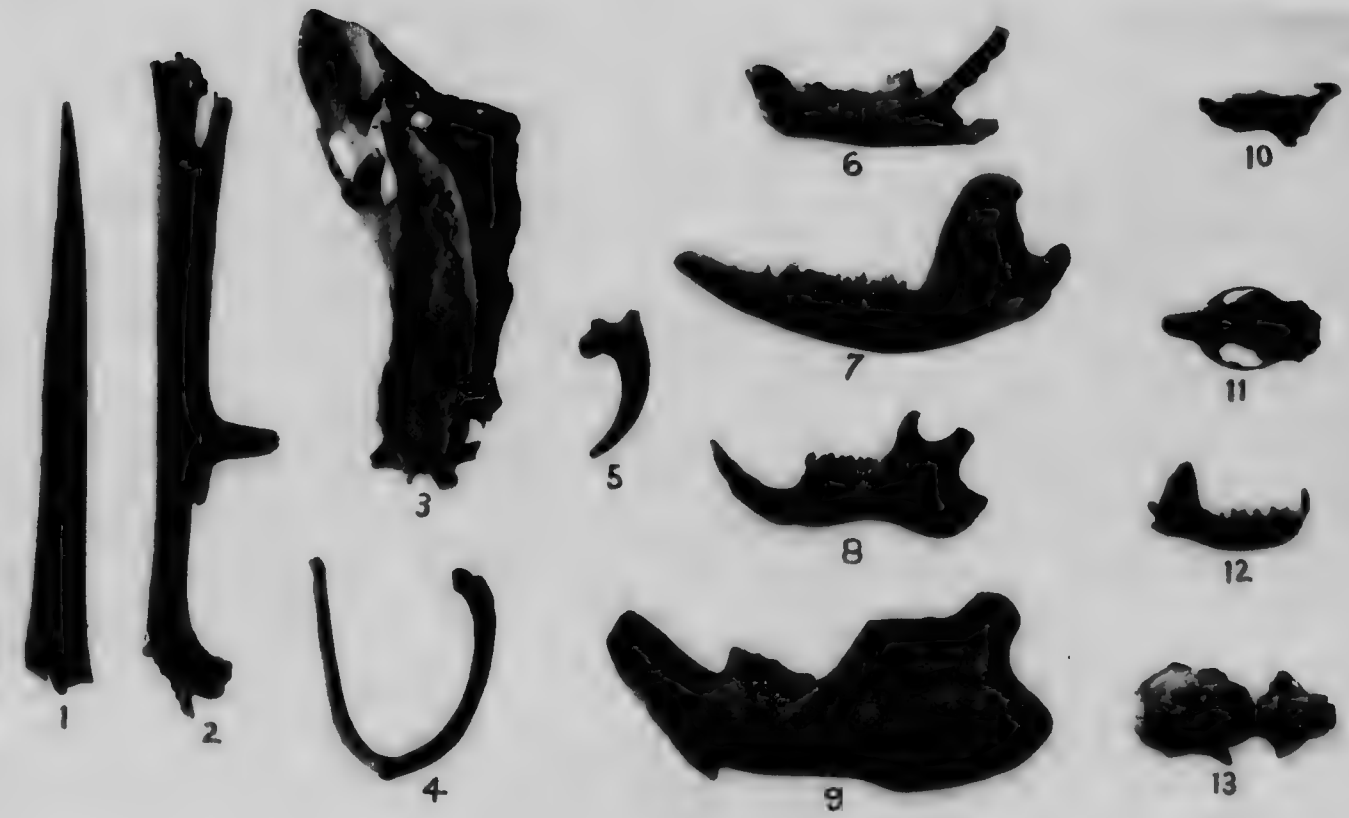
Fig. 9 (20–696). Left half of the lower jaw of a beaver. From general diggings of mound 2.

Fig. 10 (20–1293a). Left half of the lower jaw of a red or fox squirrel. From a lot of 178 such half jaws at pelvis of skeleton 190, in field.

Fig. 11 (20–796). Skull of a pack or wood rat. From left shoulder of skeleton 68, mound 2.

Fig. 12 (20–1298). Right half of the lower jaw of a mink. From the left pelvis of skeleton 193, in field.

Fig. 13 (20–745). Skull of a weasel. From general diggings of mound 2.



Resources — Animal Materials.

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PLATE XIX. RESOURCES — ANIMAL AND PLANT MATERIALS.

Fig. 1 (20–302a). Rear portion of the plastron of a box turtle. From general diggings of mound 1.

Fig. 2 (20–303). Portion of the carapace of a turtle. From general diggings of mound 1.

Fig. 3 (20–409). Vertebra of a fish. From general diggings of mound 1.

Fig. 4 (20–420a). Large unio shell. From general diggings of mound 1.

Fig. 5 (20–420b). Small unio shell. From general diggings of mound 1.

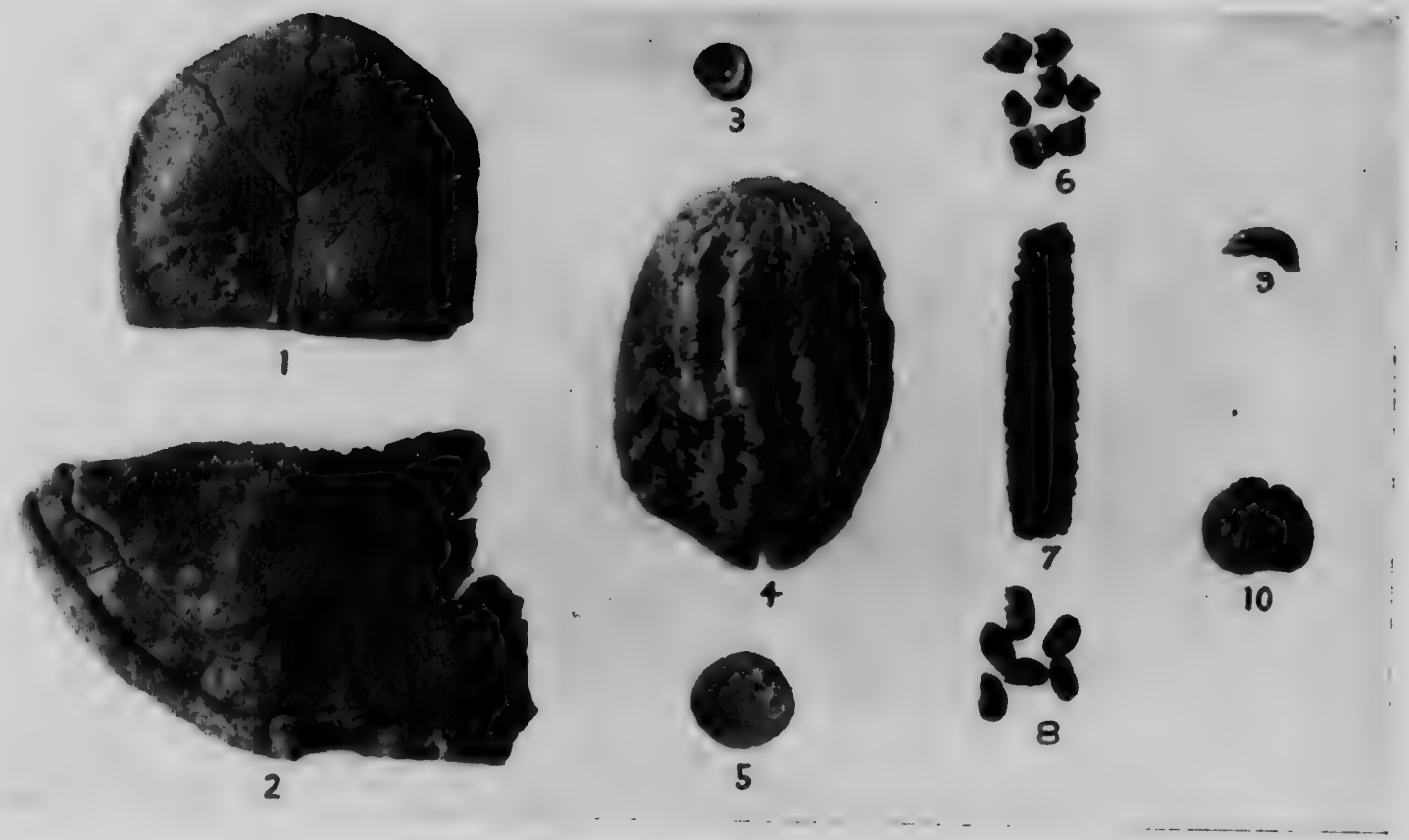
Fig. 6 (20–1303a). Charred corn. From pelvis of skeleton 194, embankment of sink hole.

Fig. 7 (20–437). Charred corn cob. From general diggings of mound 1.

Fig. 8 (20–1303b). Charred beans. From pelvis of skeleton 194, embankment of sink hole.

Fig. 9 (20–474). Charred hickory nut. From skeleton 32, mound 1.

Fig. 10 (20–1310). Charred walnut. From pelvis of skeleton 194, embankment of sink hole.



Resources — Animal and Plant Materials.

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PLATE XX. IMPLEMENTS FOR SECURING FOOD — POINTS CHIPPED FROM STONE.

Fig. 1 (20–1116a). Crudely chipped point of stone, possibly a reject. From general diggings of camp trench.

Fig. 2 (20–44a). Chipped point of yellowish gray chalcedony for arrow, spear, or knife. From surface of farm.

Fig. 3 (20–187a). Chipped point of mottled red and brown chalcedony for arrow, spear, or knife. From general diggings of mound 1.

Fig. 4 (20–583a). Chipped point of gray chalcedony, for arrow, spear, or knife, bearing mineral deposit. From general diggings of mound 2.

Fig. 5 (20–1196). Large chipped point of brown jasper for spear or knife, bearing mineral deposit. From near left hand of skeleton 5, camp trench.

Fig. 6 (20–82a). Chipped point of light brownish gray chalcedony bearing mineral deposit, for arrow or drill. From surface of farm. Presented by Col. Frederick H. Bierbower.

Fig. 7 (20–751). Chipped point of dark gray chalcedony for arrow. From general diggings of mound 2.

Fig. 8 (20–44b). Chipped point of yellowish chalcedony for arrow. From surface of farm.

Fig. 9 (20–189a). Crudely serrated chipped point of fine grained quartzite, for arrow. From general diggings of mound 1.

Fig. 10 (20–189b). Serrated finely chipped point of yellowish chert for arrow. From general diggings of mound 1.

Fig. 11 (20–586a). Chipped point of mottled red and yellow jasper for arrow or spear. The edge of the notches and base are rubbed smooth. From general diggings of mound 2.

Fig. 12 (20–188a). Chipped point of yellowish chalcedony. The edges of the notches are rubbed smooth, for arrow or spear. From general diggings of mound 1.

Fig. 13 (20–188b). Chipped point of banded gray chalcedony for arrow or spear. From general diggings of mound 1.

Fig. 14 (20–45a). Chipped point of mottled gray and yellowish chert for arrow or spear. From surface of farm.

Fig. 15 (20–188c). Chipped point of gray chalcedony. From general diggings of mound 1.

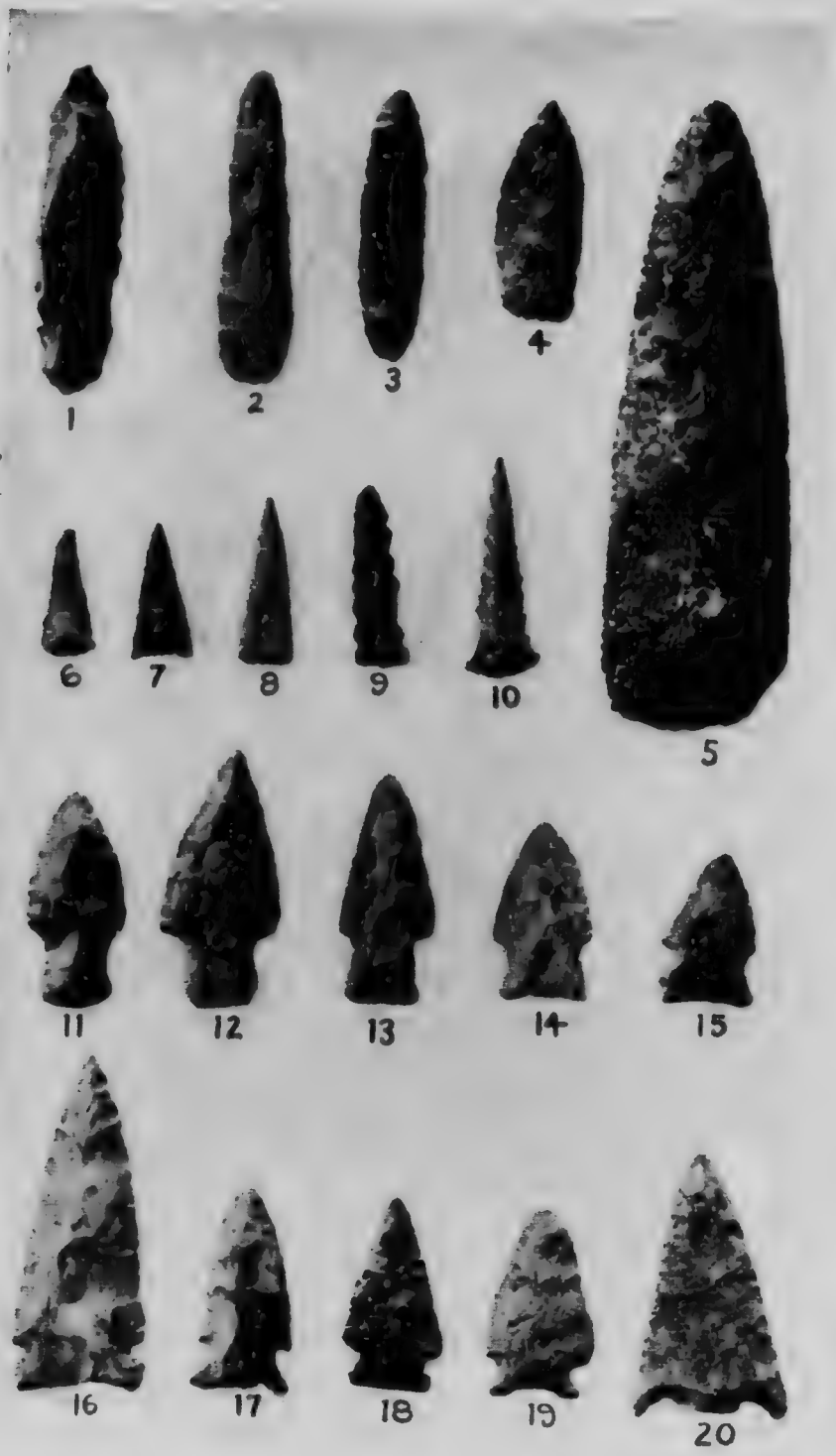
Fig. 16 (20–188d). Chipped point of banded chalcedony for arrow, knife, or spear, bearing a mineral deposit. From general diggings of mound 1.

Fig. 17 (20–83a). Chipped point of a banded brown jasper for arrow, spear, or knife. From the surface of farm. Presented by Col. Frederick H. Bierbower.

Fig. 18 (20–45b). Chipped point of mottled blue chert for arrow, spear, or knife. The edge of the base is rubbed smooth. From the surface of farm.

Fig. 19 (20–83b). Chipped point of light gray impure chalcedony for arrow, spear, or knife. From the surface of farm. Presented by Col. Frederick H. Bierbower.

Fig. 20 (20–586b). Chipped point of fine grained gray quartzite. The tang is broken off. From general diggings of mound 2.



Implements for Securing Food.

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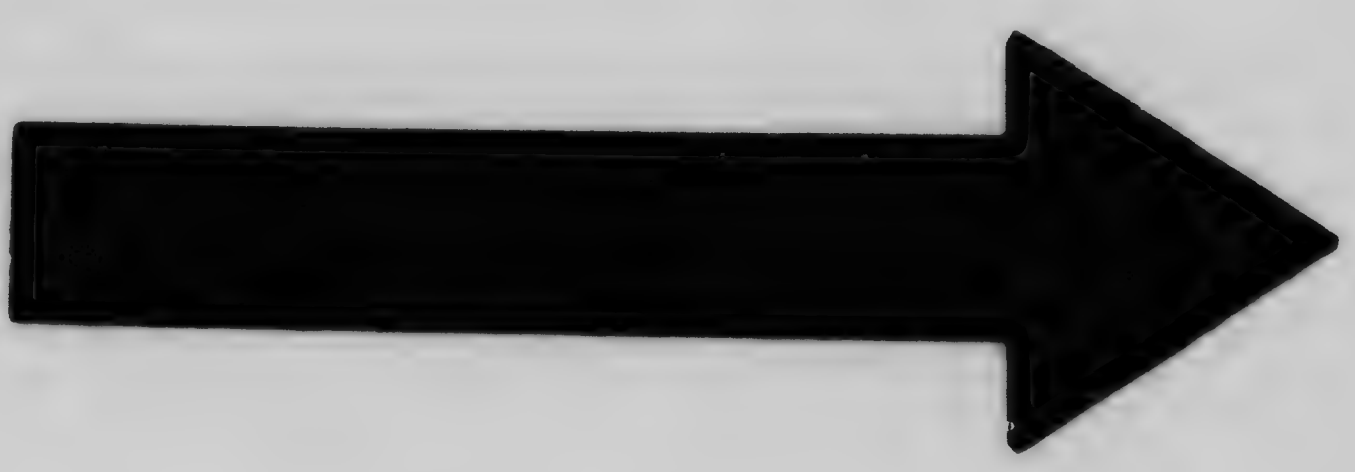

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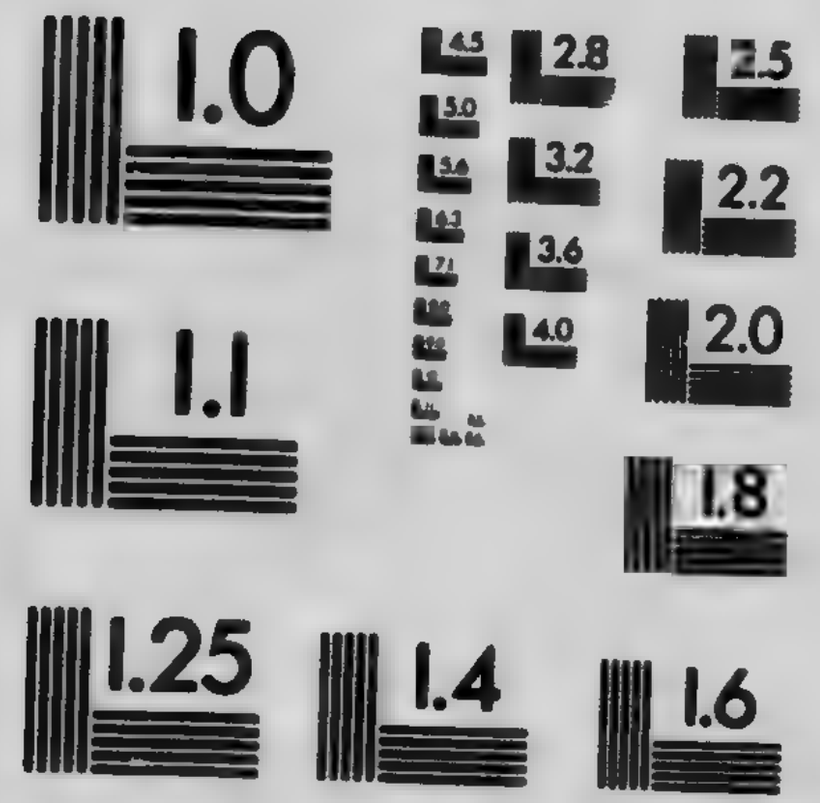

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PLATE XXI. IMPLEMENTS FOR SECURING FOOD — POINTS OF ANTLER AND BONE, FISH HOOKS OF BONE, IMPRESSION OF NETTING, ETC.

Fig. 1 (20–326a). Point made of antler, for arrow. From general diggings of mound 1.

Fig. 2 (20–326b). Point made of antler, for arrow. From general diggings of mound 1.

Fig. 3 (20–640a). Point made of antler, for arrow. From general diggings of mound 2.

Fig. 4 (20–326c). Point made of antler for arrow. From general diggings of mound 1.

Fig. 5 (20–977a). Point made of antler for arrow. From general diggings of mound 3.

Fig. 6 (20–1173). Fragment of a spatulate object made of bone. From general diggings of camp trench.

Fig. 7 (20–403a). Fragment of a spatulate object made of bone with an incision around the lower end. There is mineral deposit on the fragment. From general diggings of mound 1.

Fig. 8 (20–405a). Section cut from a whole bone the edges of which are polished, possibly part of a snare. From general diggings of mound 1.

Fig. 9 (20–712a). Section cut from a whole bone, possibly part of a snare. From general diggings of mound 2.

Fig. 10 (20–407a). Section cut from a whole bone the edges of which are polished, possibly part of a snare. From general diggings of mound 1.

Fig. 11 (20–730a). Grooved fish hook made of bone. From general diggings of mound 2.

Fig. 12 (20–898). Fish hook made of bone. From left pelvis of skeleton 105, mound 2.

Fig. 13 (20–1175). Grooved or incised fish hook made of bone. From general diggings of camp trench.

Fig. 14 (20–741). Sharpened splint from deer leg, possibly used as a fish hook. From general diggings of mound 2.

Fig. 15 (20–250). Fragment of pottery showing impression of net such as may have been used for fishing. From general diggings of mound 1.

Implements for Securing Food.

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PLATE XXII. IMPLEMENTS USED IN PREPARING FOOD — POSSIBLY KNIVES AND SPOONS.

Fig. 1 (20–187b). Point chipped from light gray chert, possibly a knife. From general diggings of mound 1.

Fig. 2 (20–144a). Chipped disc of limestone, possibly a knife or skin scraper. From general diggings of mound 1.

Fig. 3 (20–126). Fragment of limestone chipped to an edge, possibly a chopping knife or skin scraper. From general diggings of mound 1.

Fig. 4 (20–578a). Oblong piece of limestone chipped to an edge, possibly a knife or skin scraper. From general diggings of mound 2.

Fig. 5 (20–931a). Unio shell with broken perforation and bearing mineral deposit, possibly a spoon. From general diggings of mound 2.

Fig. 6 (20–933a). Unio shell sharpened to a point probably by use as a spoon. From general diggings of mound 2.

IMPLEMENTS USED IN PREPARING FOOD.

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PLATE XXIII. OBJECTS USED IN PREPARING FOOD — CHARCOAL AND POTTERY.

Fig. 1 (20–436a). Charcoal. From general diggings of mound 1.

Fig. 2 (20–242a). Fragment of pottery bearing soot and suggesting that cooking was done over open fires. From general diggings of mound 1.

Fig. 3 (20–606). Fragment of pottery sieve with punched holes. From general diggings of mound 2.

Fig. 4 (20–1128a). Fragment of pottery sieve with drilled holes. From general diggings of camp trench.

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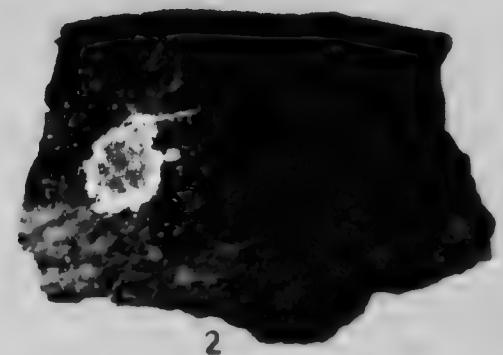

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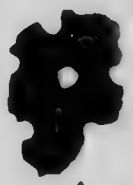

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Objects used in Preparing Food.

(Page 189)

PLATE XXIV. POTTERY — TEMPERING AND MANUFACTURE.

Fig. 1 (20–247a). Potsherd showing shell tempering material. From general diggings of mound 1.

Fig. 2 (20–604a). Potsherd showing cracked surface. From general diggings of mound 2.

Fig. 3 (20–238a). Portion of a pot rim of rough ware. From general diggings of mound 1.

Fig. 4 (20–240a). Portion of a pot rim with punched perforation probably for suspension. From general diggings of mound 1.

Fig. 5 (20–256a). Portion of a pot rim showing drilled perforation probably for suspension. From general diggings of mound 1.

Fig. 6 (20–256b). Portion of a pot rim showing large modeled perforation probably for suspension. From general diggings of mound 1.

Fig. 7 (20–630a). Pot handle showing method of attachment. From general diggings of mound 2

Fig. 8 (20–612a). Portion of a pot rim showing fold of clay and small lug. From general diggings of mound 2.

Fig. 9 (20–53a). Portion of a pot rim showing small lug. From surface of farm.

Fig. 10 (20–227). Fragment of pot rim showing lug made up of two horizontal ridges. From general diggings of mound 1.

Fig. 11 (20–630b). Fragment of a pot rim. From general diggings of mound 2.

Pottery — Tempering and Manufacture.

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PLATE XXV. POTTERY — SHOWING TRACES OF MANUFACTURE.

Fig. 1 (20–615). Potsherd showing impression of fine netting. From general diggi
of mound 2.

Fig. 2 (20–242b). Potsherd showing impression of netting. From general diggi
of mound 1.

Fig. 3 (20–240b). Potsherd showing impression of cord wrapped paddle. Fr
general diggings of mound 1.

Fig. 4 (20–242c). Potsherd showing impression of cord wrapped paddle par
smoothed down before firing. From general diggings of mound 1.

Fig. 5 (20–601a). Potsherd showing lines arently modeled to represent c
markings. From general diggings of mound 2.

Fig. 6 (20–601b). Potsherd showing impression of carved paddle. From gene
diggings of mound 2.

Pottery — Showing Traces of Manufacture.
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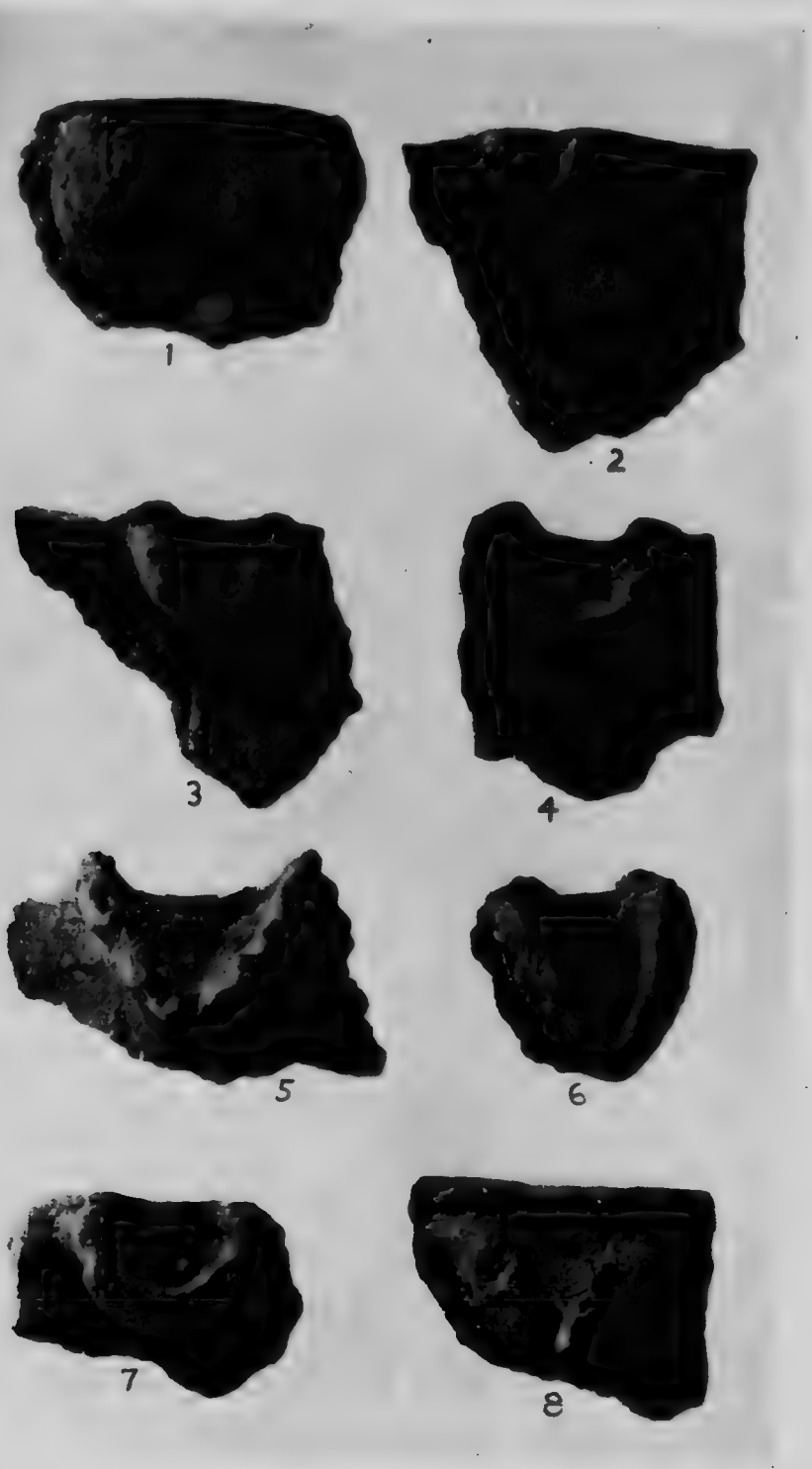
PLATE XXVI. POTTERY — RIMS WITH LUGS.

Fig. 1 (20–614).	From general diggings of mound 2.
Fig. 2 (20–216a).	From general diggings of mound 1.
Fig. 3 (20–220).	From general diggings of mound 1.
Fig. 4 (20–613a).	From general diggings of mound 2.
Fig. 5 (20–613b).	From general diggings of mound 2.
Fig. 6 (20–1126a).	From general diggings of camp trench.
Fig. 7 (20–1047a).	From general diggings of mound 5.
Fig. 8 (20–221).	From general diggings of mound 1.



Pottery — Rims with Lugs.

(Page 191)

PLATE XXVII. POTTERY — RIMS WITH LUGS.

Fig. 1 (20–215a).	From general diggings of mound 1.
Fig. 2 (20–1126b).	From general diggings of camp trench.
Fig. 3 (20–215b).	From general diggings of mound 1.
Fig. 4 (20–261a).	From general diggings of mound 1.
Fig. 5 (20–223a).	From general diggings of mound 1.
Fig. 6 (20–1126c).	From general diggings of camp trench.
Fig. 7 (20–1126d).	From general diggings of camp trench.
Fig. 8 (20–214a).	From general diggings of mound 1.

Pottery — Rims with Lugs.

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PLATE XXVIII. POTTERY — RIMS WITH LUGS.

Fig. 1 (20–1224).	From general diggings among hillside graves.
Fig. 2 (20–1308a).	From over grave 194, embankment of sink hole.
Fig. 3 (20–224a).	From general diggings of mound 1.
Fig. 4 (20–226).	From general diggings of mound 1.
Fig. 5 (20–611).	From general diggings of mound 2.
Fig. 6 (20–225).	From general diggings of mound 1.
Fig. 7 (20–610a).	From general diggings of mound 2.
Fig. 8 (20–609a).	From general diggings of mound 2.

Pottery - Rims with Lugs.

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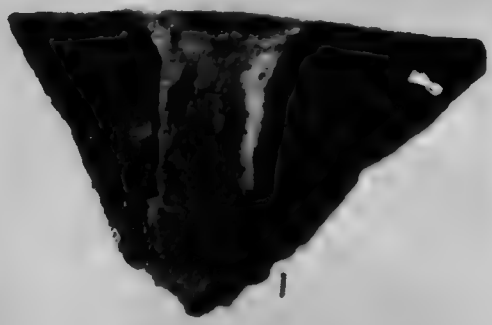
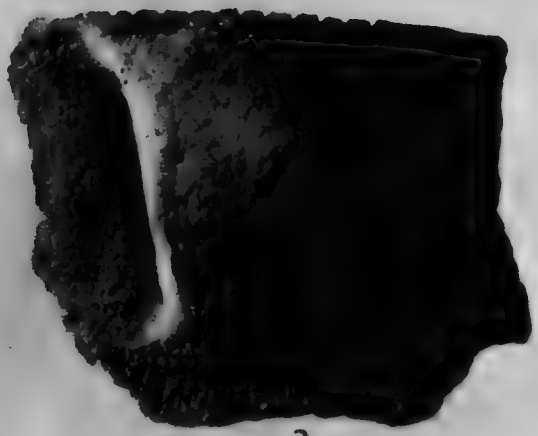
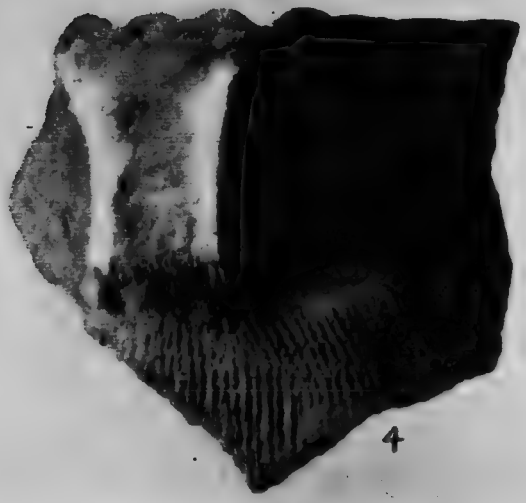
PLATE XXIX. POTTERY — HANDLES.

Fig. 1 (20–194). From general diggings of mound 1.
Fig. 2 (20–199a). From general diggings of mound 1.
Fig. 3 (20–207). From general diggings of mound 1.
Fig. 4 (20–206). From general diggings of mound 1.







Pottery — Handles.

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PLATE XXX. POTTERY — HANDLES.

Fig. 1 (20-621).	From general diggings of mound 2.
Fig. 2 (20-502a).	From general diggings of mound 2.
Fig. 3 (20-211a)	From general diggings of mound 1.
Fig. 4 (20-211b).	From general diggings of mound 1.
Fig. 5 (20-261b).	From general diggings of mound 1.
Fig. 6 (20-213).	From general diggings of mound 1.
Fig. 7 (20-214a)	From general diggings of mound 1.

Pottery — Handles.

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PLATE XXXI. TOOLS USED BY MEN — CELTS.

Fig. 1 (20–529a). Symmetrical celt made of diorite bearing mineral deposit. From general diggings of mound 2.

Fig. 2 (20–121a). Symmetrical celt made of stone bearing mineral deposit, also showing peck marks. From general diggings of mound 1.

Fig. 3 (20–529b). Symmetrical celt ground out of stone. From general diggings of mound 2.

Fig. 4 (20–957). Asymmetrical celt ground out of stone. From general diggings of mound 3.

Fig. 5 (20–847). Asymmetrical celt ground out of diabase. From right of skeleton 80, mound 2.

Fig. 6 (20–74). Asymmetrical celt made of stone. From the surface of farm. Presented by Col. Frederick H. Bierbower.

Fig. 7 (20–529c). Very asymmetrical celt or adze made of diabase bearing mineral deposit. From general diggings of mound 2.

Fig. 8 (20–121b). Symmetrical celt chipped, pecked, and ground out of [illegible] ing mineral deposit. From general diggings of mound 1.

Fig. 9 (20-120). Asymmetrical celt chipped out of brown jasper. Fr[illegible] al diggings of mound 1.

Fig. 10 (20–311a). Asymmetrical celt or adze made of antler. From general diggings of mound 1.

Tools used by Men.

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PLATE XXXII. TOOLS USED BY MEN — HAMMERS AND PITTED STONES.

Fig. 1 (20-1092a). Pebble chipped and battered from use as a hammer. From general diggings of camp trench.

Fig. 2 (20-559a). Pebble chipped and battered from use as a hammer, bearing mineral deposit. From general diggings of mound 2.

Fig. 3 (20-558a). Pebble battered in facets, from use as a hammer. From general diggings of mound 2.

Fig. 4 (20-533a). Hammerstone slightly pitted on each side. From general diggings of mound 2.

Fig. 5 (20-1090a). Hammerstone deeply pitted on each side. From general diggings of camp trench.

Fig. 6 (20-6). Hammerstone having double pits on each side. From surface of farm.

Fig. 7 (20-18). Fragment of limestone bearing pecked pit. From surface of farm.

Tools used by Men.

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PLATE XXXIII. TOOLS USED BY MEN — WHETSTONES, GROOVED STONES, KNIVES, DRILLS, ETC.

Fig. 1 (20-567a). Burned whetstone made of gritstone. From general diggings of mound 2.

Fig. 2 (20-955). Whetstone of celt shape made of gray sandstone. From general diggings of mound 2.

Fig. 3 (20-27a). Grooved fragment of light brown sandstone, probably an arrow-shaft smoother. From surface of farm.

Fig. 4 (20-169a). Incised fragment of light brown sandstone, probably used for sharpening bone awls and similar objects. From general diggings of mound 1.

Fig. 5 (20-564). Fragment of gray limestone of sub-triangular pyramidal form bearing a longitudinal groove in one side, possibly an arrow-shaft smoother or for sharpening bone awls and similar objects. From general diggings of mound 2.

Fig. 6 (20-28). Fragment of purplish brown sandstone resembling one end of an arrow-shaft smoother of semi-cylindrical form with rounded ends and having a longitudinal groove in the middle of the flat side. From surface of farm.

Fig. 7 (20-765). Fragment of a chisel made of the metatarsus of a deer. From below south top stone of grave 60, mound 2.

Fig. 8 (20-1145). Cylindrical object with pointed end made of antler. From general diggings of camp trench.

Fig. 9 (20-654a). Cylindrical object of antler, possibly a flaker. From general diggings of mound 2.

Fig. 10 (20-653). Section of antler with ends rounded and ridge scraped smooth, possibly a flaker or unfinished knife handle. From general diggings of mound 2.

Fig. 11 (20-389a). Lower incisor of a beaver with the base cut off by grooving and breaking and the inner surface gouged out, probably used as a knife. From general diggings of mound 1.

Fig. 12 (20-389b). Lower incisor of a beaver with the base cut off by grooving and breaking and the inner surface gouged out, probably used as a knife. From general diggings of mound 1.

Fig. 13 (20-707a). Lower incisor of a beaver with the base cut off by grooving and breaking, the inner surface gouged out and the other surfaces highly polished from use, probably as a knife. From general diggings of mound 2.

Fig. 14 (20-708). The exterior portion of the cutting edge of a beaver tooth cut out along the sides and base, probably used as a knife. From general diggings of mound 2.

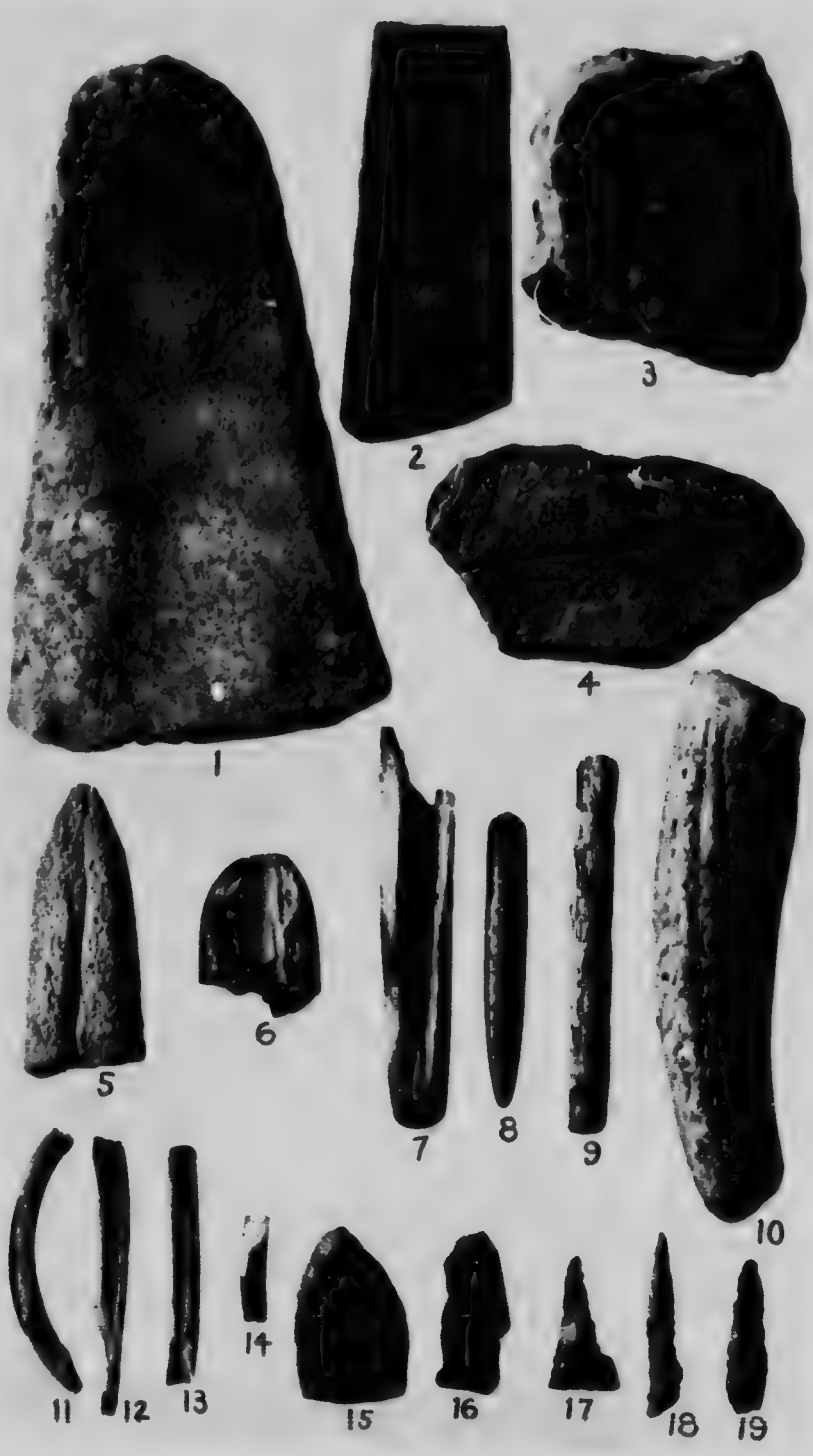
Fig. 15 (20-583b). Point chipped from yellowish chert, the end of which is rubbed smooth possibly from use as a knife. From general diggings of mound 2.

Fig. 16 (20-1219a). Chip of chalcedony such as was probably used in cutting. From among general diggings of the hillside graves.

Fig. 17 (20-190a). Point for a drill chipped from mottled gray and yellowish chalcedony. From general diggings of mound 1.

Fig. 18 (20-807). Point for a drill chipped from gray chert. From general diggings of mound 2.

Fig. 19 (20-190b). Point for drill chipped from pink chalcedony. From general diggings of mound 1.



Tools used by Men.

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PLATE XXXIV. TOOLS USED BY WOMEN — SCRAPERS, AWLS, AND NEEDLES.

Fig. 1 (20–45c). Symmetrical chipped point of pinkish chalcedony rubbed smooth probably from use as a skin scraper. From surface of farm.

Fig. 2 (20–315). Skin scraper made of the metatarsus of a deer. From general diggings of mound 1.

Fig. 3 (20–348a). Awl made of the proximal part of the tarsometatarsus of a wild turkey. From general diggings of mound 1.

Fig. 4 (20–681). Awl made of the proximal part of the tarsometatarsus of a wild turkey ornamented with six notches and highly polished from use. From general diggings of mound 2.

Fig. 5 (20–675). Awl with highly polished point made of the distal part of the tibiotarsus of a wild turkey. From general diggings of mound 2. (See Plate XL, Fig. 14.)

Fig. 6 (20–354a). Awl, highly polished from use, made of the proximal part of the tibio-tarsus of a wild turkey. From general diggings of mound 1.

Fig. 7 (20–676). Awl, highly polished from use, made of the proximal part of the tibio-tarsus of a wild turkey, and ornamented with eight notches. From general diggings of mound 2.

Fig. 8 (20–722a). Awl made of a fragment of a long bone of a quadruped. From general diggings of mound 2.

Fig. 9 (20–360a). Awl or unfinished needle made of a fragment of the long bone of a bird, bearing mineral deposit. From general diggings of mound 1.

Fig. 10 (20–400). Fragment of an object made of bone, probably an awl. From general diggings of mound 1.

Fig. 11 (20–740a). Splint from the leg of a deer, possibly used as an awl. From general diggings of mound 2.

Fig. 12 (20–1151). Awl made from the distal end of the metatarsus of a deer. From general diggings of camp trench. (See Plate XL, Fig. 4.)

Fig. 13 (20–362a). Awl made from the longitudinal half of the distal end of the metatarsus of a deer. From general diggings of mound 1.

Fig. 14 (20–832). Awl made of about one half of the proximal end of the metatarsus of a deer. From left hand of skeleton 74, mound 2.

Fig. 15 (20–722b). Awl made of a bone. From general diggings of mound 2.

Fig. 16 (20–1171). Highly polished object made of a portion of the long bone of a bird, possibly an unfinished needle. From general diggings of camp trench.

Fig. 17 (20–723a). Needle made of bone with an eye. From general diggings of mound 2.

Tools used by Women

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PLATE XXXV. TOOLS USED BY WOMEN — AWLS.

Fig. 1 (20–670a). Awl made of the proximal part of the ulna of a young elk. From general diggings of mound 2.

Fig. 2 (20–667a). Highly polished awl made of the proximal part of the ulna of a deer. From general diggings of mound 2.

Fig. 3 (20–668a). Awl made of the proximal part of the ulna of a deer with the base smoothed off. From general diggings of mound 2.

Fig. 4 (20–346a). Awl made of pubis bone of the black bear. From general diggings of mound 1.

Fig. 5 (20–693). Awl made of the pathological ulna of the black bear. From general diggings of mound 2.

Fig. 6 (20–347). Awl made of the ulna of a lynx. From general diggings of mound 1.

Tools used by Women.

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PLATE XXXVI. PROCESSES OF MANUFACTURE — RUBBING AND CUTTING.

Fig. 1 (20–1103a). Brown sandstone grinding stone. From general diggings of camp trench.

Fig. 2 (20–122a). Stone celt with ground point. From general diggings of mound 1.

Fig. 3 (20–232a). Disc made of a fragment of pottery with ground edge. From general diggings of mound 1.

Fig. 4 (20–654b). Cylindrical piece of antler with surface probably ground. From general diggings of mound 2.

Fig. 5 (20–361a). Awl made of the proximal part of the ulna of a deer, with ground point. From general diggings of mound 1.

Fig. 6 (20–933b). A spoon-like object made of unio shell with ground or worn edge. From general diggings of mound 2.

Fig. 7 (20–42a). Flake of chalcedony such as was probably used for cutting. From surface of farm.

Fig. 8 (20–540a). Stone showing cut lines. From general diggings of mound 2.

Fig. 9 (20–266). Potsherd bearing handle and showing cut edge. From general diggings of mound 1.

Fig. 10 (20–942). Shell showing two cut edges. From general diggings of mound 2.

Fig. 11 (20–425). Shell with cut edge. From general diggings of mound 1.

Fig. 12 (20–1150). Deer bone showing transverse cutting. From general diggings of camp trench.

Fig. 13 (20–404). Bird bone showing transverse and longitudinal cutting. From general diggings of mound 1.

Fig. 14 (20–412). Bird bone showing transverse and longitudinal cutting. From general diggings of mound 1.

Fig. 15 (20–419a). Rectangular piece cut out of bone. From general diggings of mound 1.

Fig. 16 (20–1000). Ulna of deer showing where end is cut off. From general diggings of mound 3.

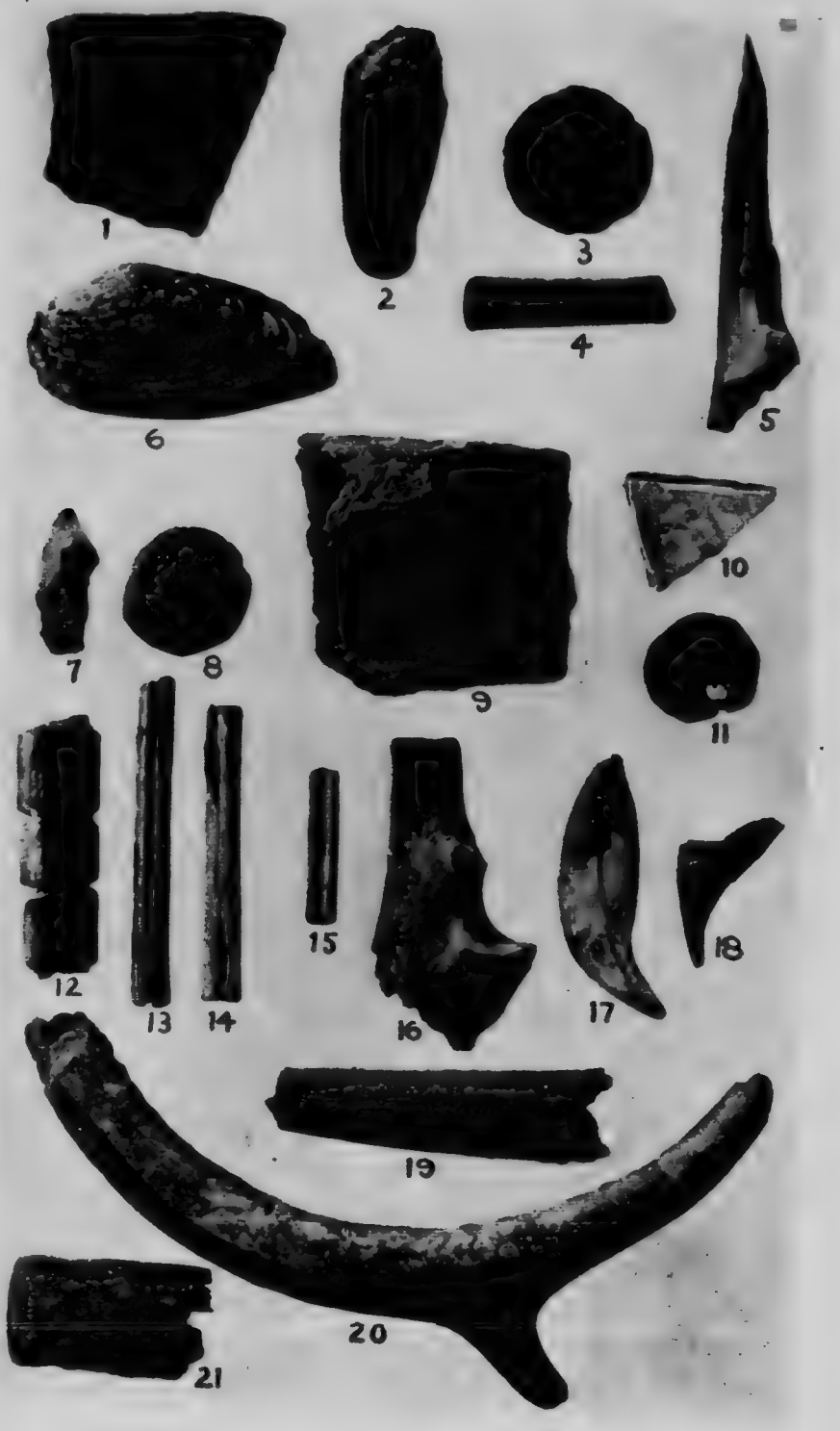
Fig. 17 (20–385a). Canine tooth of a bear showing cut grooving. From general diggings of mound 1.

Fig. 18 (20–384). Tip cut from canine tooth of a bear. From general diggings of mound 1.

Fig. 19 (20–635a). Prong of antler showing transverse cutting. From general diggings of mound 2.

Fig. 20 (20–648a). Piece of antler showing longitudinal cutting. From general diggings of mound 2.

Fig. 21 (20–980). Piece of antler showing cut edge. From general diggings of mound 3.



Processes of Manufacture.

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PLATE XXXVII. PROCESSES OF MANUFACTURE — DRILLING, PUNCHING, CHIPPING, AND PECKING.

Fig. 1 (20–150a). Sandstone with drilled hole. From general diggings of mound 1.

Fig. 2 (20–179). Slate showing drilled hole. From general diggings of mound 1.

Fig. 3 (20–234a). Pottery showing drilling. From general diggings of mound 1.

Fig. 4 (20–426a). Shell showing drilling. From general diggings of mound 1.

Fig. 5 (20–739). Bone showing drilling. From general diggings of mound 2.

Fig. 6 (20–699). Canine tooth of a black bear showing drilling. From general diggings of mound 2

Fig. 7 (20–393a). Canine tooth of a small carnivor showing drilling. From general diggings of mound 1.

Fig. 8 (20–395a). Incisor of an elk showing drilling. From general diggings of mound 1.

Fig. 9 (20–700). Canine tooth of an elk showing drilling. From general diggings of mound 2.

Fig. 10 (20–666). Fragment of turtle shell showing drilling. From general diggings of mound 2.

Fig. 11 (20–312a). Fragment of antler showing drilling. From general diggings of mound 1.

Fig 12 (20–961a). Point for drill made of yellowish chalcedony. From general diggings of mound 3.

Fig. 13 (20–40a). Longitudinal fragment of limestone pipe showing cores left by hollow drill. From surface of farm. (See Plate XLVI, Fig. 12.)

Fig. 14 (20–51a). Fragment of pottery showing punched holes. From surface of farm.

Fig. 15 (20–583c). Leaf-shaped object of chalcedony showing chipping. From general diggings of mound 2.

Fig. 16 (20–971a). Disc of pottery showing chipping. From general diggings of mound 3.

Fig. 17 (20–123a). Poll of celt showing pecking. From general diggings of mound 1.

Processes of Manufacture.

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PLATE XXXVIII. MANUFACTURE — POINTS CHIPPED OUT OF STONE AND POINTS RUBBED OUT OF ANTLER.

Fig. 1 (20–570a). Fragment of chalcedony from which pieces have been chipped. From general diggings of mound 2.

Fig. 2 (20–130a). Hammer, possibly used in chipping. From general diggings of mound 1.

Fig. 3 (20–42b, c). Chips. From surface of farm.

Fig. 4 (20–581a). Unfinished object made by chipping with a hammer pebble such as was finished by flaking. From general diggings of mound 2.

Fig. 5 (20–416a). Cylinder of antler possibly used as a flaker. From general diggings of mound 1.

Fig. 6 (20–42d, e). Flakes. From surface of farm.

Fig. 7 (20–189c). Finished serrated point for an arrow made of gray chalcedony by chipping and flaking. From general diggings of mound 1.

Fig. 8 (20–327a). Prong broken from antler. From general diggings of mound 1.

Fig. 9 (20–580a). Flake of chert such as may have been used for cutting antler. From general diggings of mound 2.

Fig. 10 (20–825). Prong broken from antler, with transverse cut started. From eighteen inches above skeleton 70, mound 2.

Fig. 11 (20–324a) Tip of antler showing transverse cutting. From general diggings of mound 1.

Fig. 12 (20–320a, 636). Prong of antler and tip removed by transverse cutting and breaking. From general diggings of mounds 1 and 2.

Fig. 13 (20–637). Tip cut and broken from prong of deer antler. From general diggings of mound 2.

Fig. 14 (20–565). Sandstone such as was used for sharpening antler. From general diggings of mound 2.

Fig. 15 (20–638). Tip cut and broken from antler and sharpened on sandstone or by scraping with a stone flake. From general diggings of mound 2.

Fig. 16 (20–588a). Drill point chipped from chalcedony such as was used in drilling hole in base of antler tip. From general diggings of mound 2.

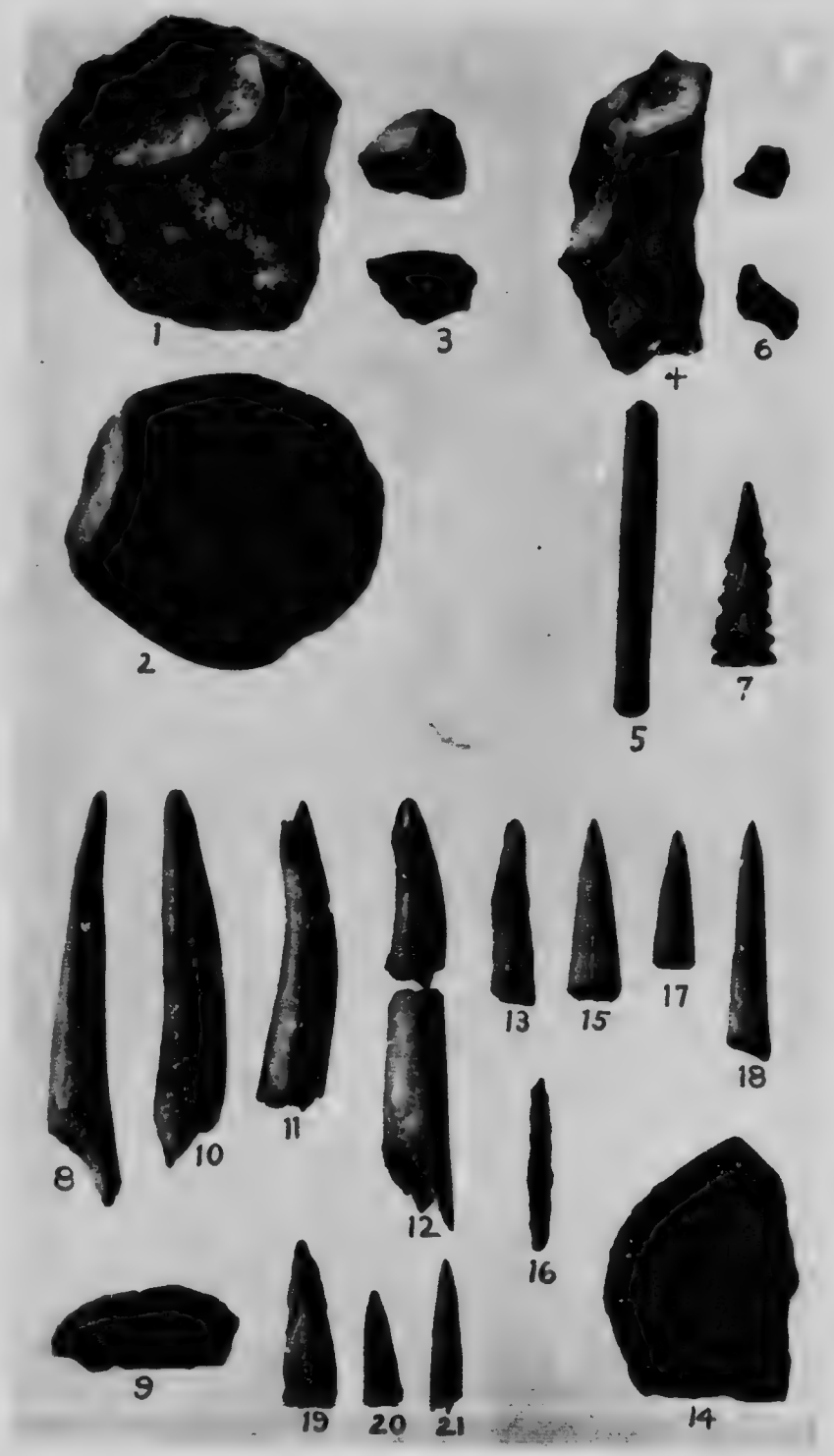
Fig. 17 (20–977b). Tip of antler cut and broken from prong sharpened on sandstone and drilled in base for the reception of an arrow-shaft. From general diggings of mound 3.

Fig. 18 (20–1142a). Finished arrow point made of antler and cut around the base with stone flake to form barb. From general diggings of camp trench.

Fig. 19 (20–1142b). Tip of antler showing whittling with such an object as a flake of stone. From general diggings of camp trench.

Fig. 20 (20–1142c). Tip of antler showing whittling with such an object as a flake of stone. From general diggings of camp trench.

Fig. 21 (20–1142d). Tip of antler showing striations of a drill. From general diggings of camp trench.



MANUFACTURE.
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PLATE XXXIX. MANUFACTURE — FISH HOOKS OF BONE AND CELTS OF ANTLER.

Fig. 1 (20–749a). Humerus of a turkey. From general diggings of mound 2.

Fig. 2 (20–186a). Chip of chert such as may have been used for cutting bone of a turkey. From general diggings of mound 1.

Fig. 3 (20–365a). Humerus of a turkey from which rectangular piece has been cut. From general diggings of mound 1.

Fig. 4 (20–365b). Humerus of a turkey from which rectangular piece has been cut. From general diggings of mound 1.

Fig. 5 (20–738a). Piece cut from bird bone. From general diggings of mound 2.

Fig. 6 (20–190c). Drill point chipped from chert, such as may have been used for drilling bone. From general diggings of mound 1.

Fig. 7 (20–728a). Fragment of bone showing where ends have been drilled. From general diggings of mound 2.

Fig 8 (20–730b). Fish hook made of piece of bone by drilling holes in ends and cutting. From general diggings of mound 2.

Fig. 9 (20–730c). Fish hook made of piece of bone by cutting out interior. From general diggings of mound 2.

Fig. 10 (20–366). Piece of bone or antler rounded at the end with drilled pit in the center near this end and a scraped groove, possibly in process of manufacture into a fish hook. From general diggings of mound 1.

Fig. 11 (20–580b). Chip of chalcedony such as may have been used for cutting antler. From general diggings of mound 2.

Fig. 12 (20–298). Piece of antler grooved longitudinally, probably with a chipped stone. From general diggings of mound 1.

Fig. 13 (20–138a). Piece of light brown sandstone possibly used for grinding antler. From general diggings of mound 1.

Fig. 14 (20–311b). Finished celt cut longitudinally from a piece of antler and ground smooth. From general diggings of mound 1.

Manufacture.

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PLATE XL. MANUFACTURE — SCRAPERS AND AWLS MADE OF BONE.

Fig. 1 (20–690a). Metacarpal of a deer. From general diggings of mound 2.

Fig. 2 (20–960a). Chip of jasper which may have been used for cutting bone. From general diggings of mound 3.

Fig. 3 (20–316a). Fragment of a scraper made from the metatarsus of a deer. From general diggings of mound 1.

Fig. 4 (20–1151). Awl made from the distal end of the metatarsus of a deer. From general diggings of camp trench. (See Plate XXXIV, Fig. 12.)

Fig. 5 (20–362b). Awl made of half of the distal end of the metatarsus of a deer. From general diggings of mound 1.

Fig. 6 (20–169b). Fragment of yellowish sandstone such as may have been used for grinding and sharpening bone. From general diggings of mound 1.

Fig. 7 (20–669a). Ulna of a deer. From general diggings of mound 2.

Fig. 8 (20–667b). Awl made of ulna of a deer. From general diggings of mound 2.

Fig. 9 (20–678a). Tarsometatarsus of a wild turkey. From general diggings of mound 2.

Fig. 10 (20–349a). Awl made of the tarsometatarsus of a wild turkey. From general diggings of mound 1.

Fig. 11 (20–352a). Awl made of the tarsometatarsus of a wild turkey ornamented with four notches. From general diggings of mound 1.

Fig. 12 (20–672a). Tibio-tarsus of a female wild turkey. From general diggings of mound 2.

Fig. 13 (20–674a). Awl made of the proximal end of the tibio-tarsus of a wild turkey. From general diggings of mound 2.

Fig. 14 (20–675). Awl made of the distal end of the tibio-tarsus of a wild turkey. From general diggings of mound 2.

Manufacture.
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PLATE XLI. MANUFACTURE — DISCS OF STONES AND POTTERY.

Fig. 1 (20–138b). Piece of sandstone. From general diggings of mound 1.

Fig. 2 (20–148a). Piece of sandstone chipped to disc shape. From general diggings of mound 1.

Fig. 3 (20–157a). Piece of sandstone chipped to disc shape, roughly ground, and partly drilled. From general diggings of mound 1.

Fig. 4 (20–553a). Piece of sandstone chipped to disc shape and drilled. From general diggings of mound 2. (See Plate XLIV, Fig. 17.)

Fig. 5 (20–1097). Finished perforated disc of sandstone marked with lines and dots. From general diggings of camp trench.

Fig. 6 (20–577). Celt chipped and ground from jasper. Such a stone may have been used to chip stone and pottery into discs. From general diggings of mound 2.

Fig. 7 (20–137). Fine ground sandstone such as may have been used to smooth discs. From general diggings of mound 1.

Fig. 8 (20–588b). Drill point chipped from chert such as may have been used for perforating discs. From general diggings of mound 2.

Fig. 9 (20–588c). Small drill chipped from chalcedony such as may have been used for dotting discs. From general diggings of mound 2.

Fig. 10 (20–902). Flake of jasper such as may have been used for marking discs. From general diggings of mound 2.

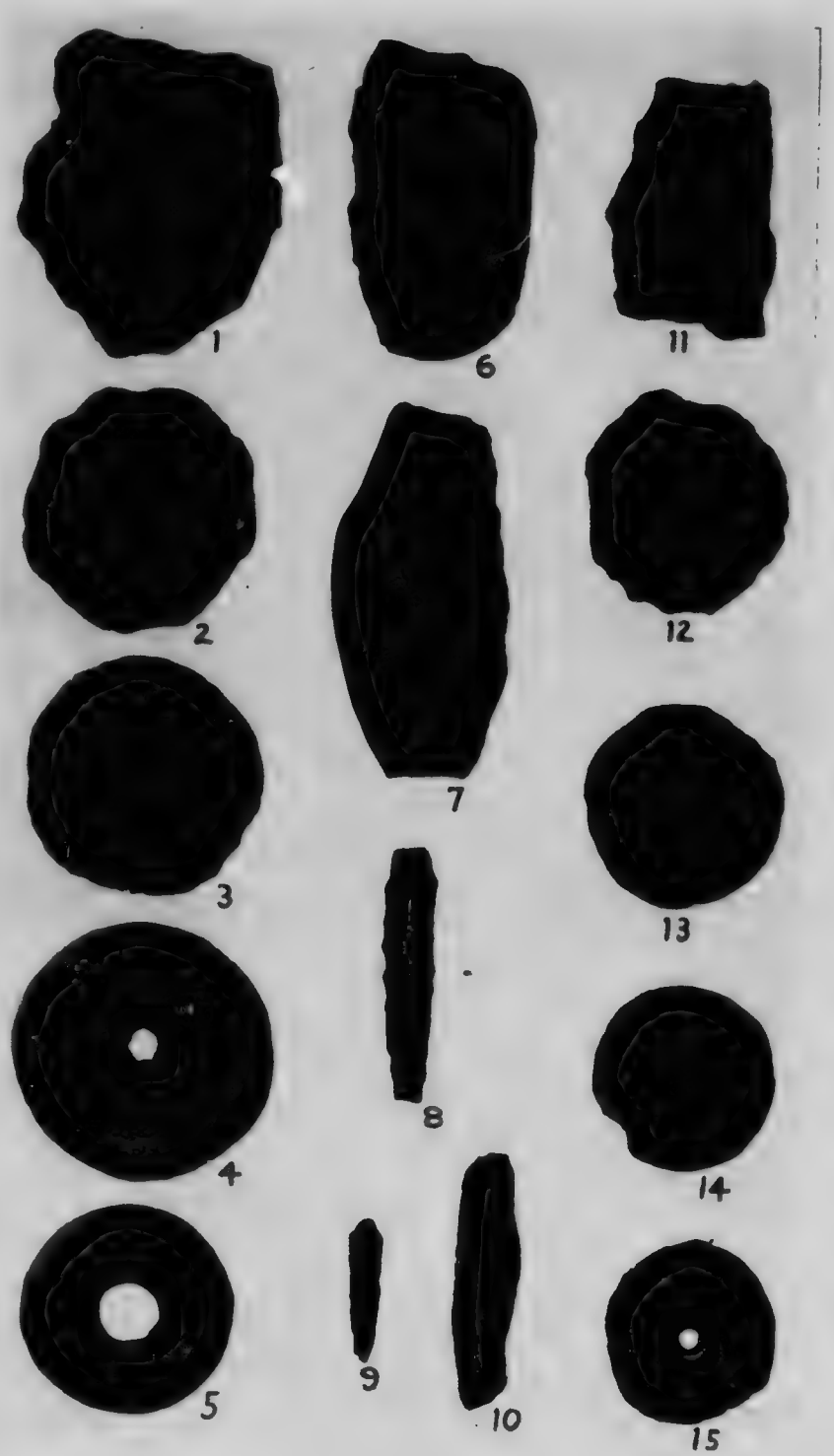
Fig. 11 (20–2006). Fragment of pottery such as was chipped into discs. From surface near mounds on the farm of Sanford Mitchel, two miles southeast of May's Lick.

Fig. 12 (20–624a). Fragment of pottery chipped into disc form. From general diggings of mound 2.

Fig. 13 (20–232). Fragment of pottery chipped into disc form and having ground edges. From general diggings of mound 1.

Fig. 14 (20–626). Fragment of pottery chipped into disc form, having ground edges and with perforation started. From general diggings of mound 2.

Fig. 15 (20–627a). Finished perforated disc made of pottery. From general diggings of mound 2.



Manufacture
(Page 210)

PLATE XLII. MANUFACTURE — WHISTLES, BEADS, ETC., MADE OF BONE.

Fig. 1 (20–713a). Bird bone with ends broken off. From general diggings of mound 2

Fig. 2 (20–413). Whistle made of bird bone. From general diggings of mound 1,

Fig. 3 (20–961c). Drill point chipped from stone. From general diggings of mound 3.

Fig. 4 (20–685a). Penis bone of raccoon. From general diggings of mound 2.

Fig. 5 (20–1166). Penis bone of raccoon with base cut off and tip perforated. From general diggings of camp trench.

Fig. 6 (20–719a). Phalanx of deer. From general diggings of mound 2.

Fig. 7 (20–42f). Fragment of point chipped from chalcedony such as was used for cutting. From surface of farm.

Fig. 8 (20–961b). Drill point chipped from chalcedony such as was used for perforating. From general diggings of mound 3.

Fig. 9 (20–721a). Phalanx of deer with proximal end cut off and distal end perforated for use in ring and pin game. From general diggings of mound 2

Fig. 10 (20–367). Tibia of small mammal. From general diggings of mound 1.

Fig. 11 (20–368). Tibia of small mammal from which end has been cut. From general diggings of mound 1.

Fig. 12 (20–769). Piece of long bone from which end has been cut, incised around in order to remove section for a bead. From general diggings of mound 2.

Fig. 13 (20–410a). End of long bone of a quadruped from which end has been cut, incised around in order to cut section for a bead. From general diggings of mound 1.

Fig. 14 (20–407b). Bead made of section cut from a bird bone. From general diggings of mound 1.

Fig. 15 (20–411a). Distal end of a humerus from which section has been cut. From general diggings of mound 1.

Fig. 16 (20–317). Distal end of metatarsus of deer from which section has been cut. From general diggings of mound 1.

Fig. 17 (20–960b). Chipped point made of jasper, such as may have been used for cutting bone. From general diggings of mound 3.

Manufacture.

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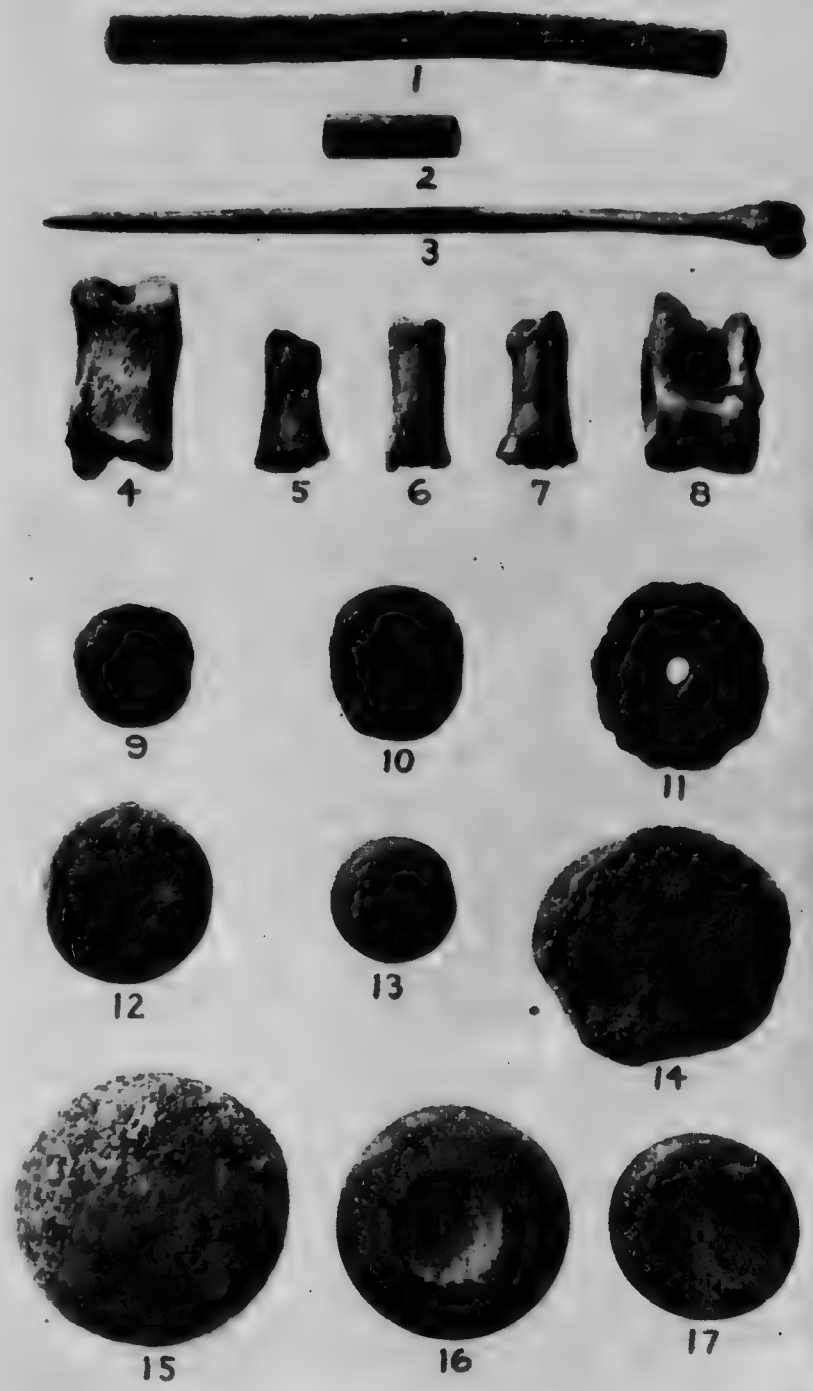
PLATE XLIII. GAMES — CYLINDERS, RING AND PIN, ASTRAGALUS, AND DISCS OF POTTERY AND STONE.

Fig. 1 (20–402a). Cylinder of antler. From general diggings of mound 1.
Fig. 2 (20–417a). Cylinder of antler. From general diggings of mound 1.
Fig. 3 (20–398a). Awl made of bone. From general diggings of mound 1.
Fig. 4 (20–375a). Phalanx of an elk. From general diggings of mound 1.
Fig. 5 (20–379a). Phalanx of a deer. From general diggings of mound 1.
Fig. 6 (20–379b). Phalanx of a deer. From general diggings of mound 1.
Fig. 7 (20–379c). Phalanx of a deer. From general diggings of mound 1.
Fig. 8 (20–376a). Astragalus of a deer. From general diggings of mound 1.
Fig. 9 (20–624b). Disc made of pottery. From general diggings of mound 2.
Fig. 10 (20–232b). Disc made of pottery. From general diggings of mound 1.
Fig. 11 (20–233a). Disc made of pottery. From general diggings of mound 1.
Fig. 12 (20–540c). Disc made of yellowish sandstone. From general diggings of mound 2.
Fig. 13 (20–547). Disc made of yellowish sandstone pecked concavely on the reverse. From general diggings of mound 2.
Fig 14 (20–144b). Disc chipped from gray limestone. From general diggings of mound 1.
Fig. 15 (20–156). Disc made of limestone, convex on the reverse. From general diggings of mound 1.
Fig. 16 (20–543). Disc made of limestone having hollow in the center and being convex on the reverse. From general diggings of mound 2.
Fig. 17 (20–542). Disc made of stone, convex on the reverse. From general diggings of mound 2.



GAMES.

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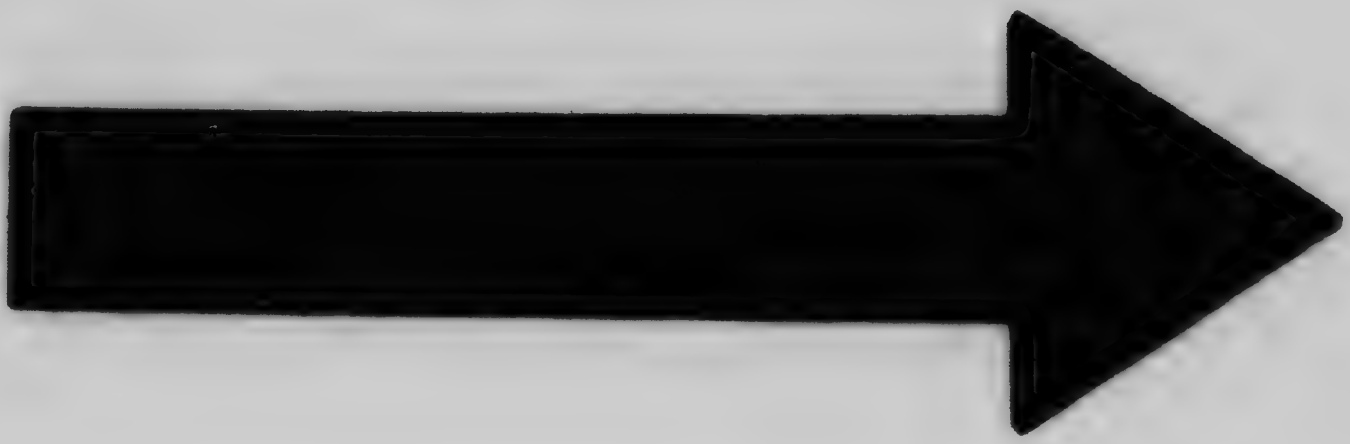
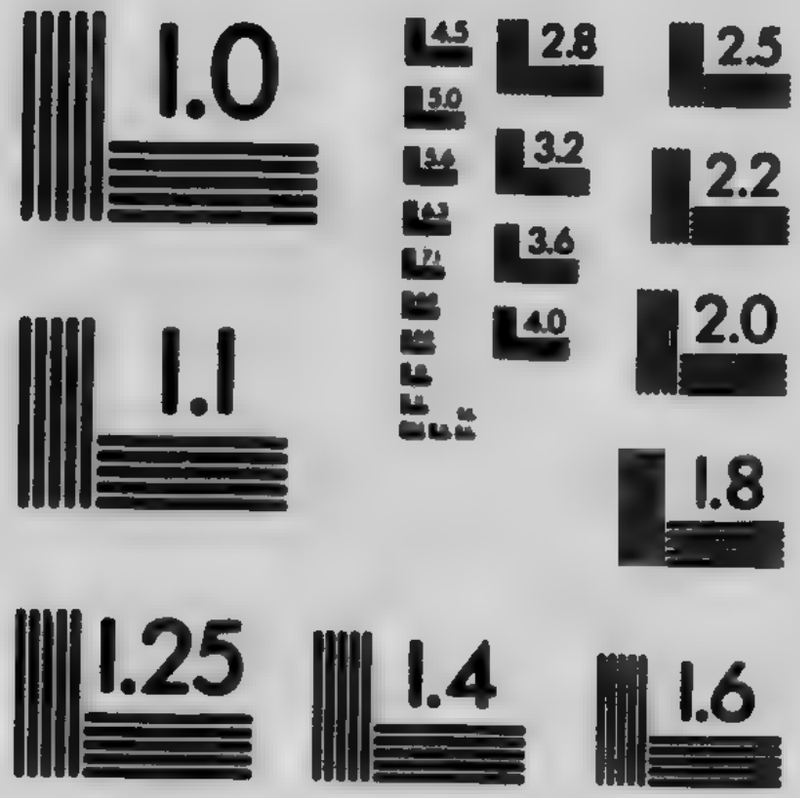


MICROCOPY RESOLUTION TEST CHART

(ANSI and ISO TEST CHART No. 2)



APPLIED IMAGE Inc
1653 East Main Street
Rochester, New York 14609 USA
(716) 482 - 0300 - Phone
(716) 288 - 5989 - Fax

PLATE XLIV. GAMES — DISCS MADE OF STONE.

Fig. 1 (20–963a). Yellowish sandstone. From general diggings of mound 3.

Fig. 2 (20–75). Yellowish sandstone. From surface of farm. Presented by Col. Frederick H. Bierbower.

Fig. 3 (20–964). Yellowish sandstone. From general diggings of mound 3.

Fig. 4 (20–549a). Yellowish sandstone. From general diggings of mound 2.

Fig. 5 (20–552a). Yellowish sandstone. From general diggings of mound 2.

Fig. 6 (20–1095a). Yellowish sandstone. From general diggings of camp trench.

Fig. 7 (20–549b). Limestone. From general diggings of mound 2.

Fig. 8 (20–551). Yellowish sandstone. From general diggings of mound 2.

Fig. 9 (20–80). Reddish sandstone. From surface of farm. Presented by Col. Frederick H. Bierbower. (See Plate LII, Fig. 3.)

Fig. 10 (20–77). Yellowish sandstone. From surface of farm. Presented by Col. Frederick H. Bierbower. (See Plate LII, Fig. 4.)

Fig. 11 (20–555). Gray sandstone. From general diggings of mound 2. (See Plate LII, Fig. 6.)

Fig. 12 (20-162). Gray sandstone. From general diggings of mound 1.

Fig. 13 (20–545a). Reddish sandstone. From general diggings of mound 2.

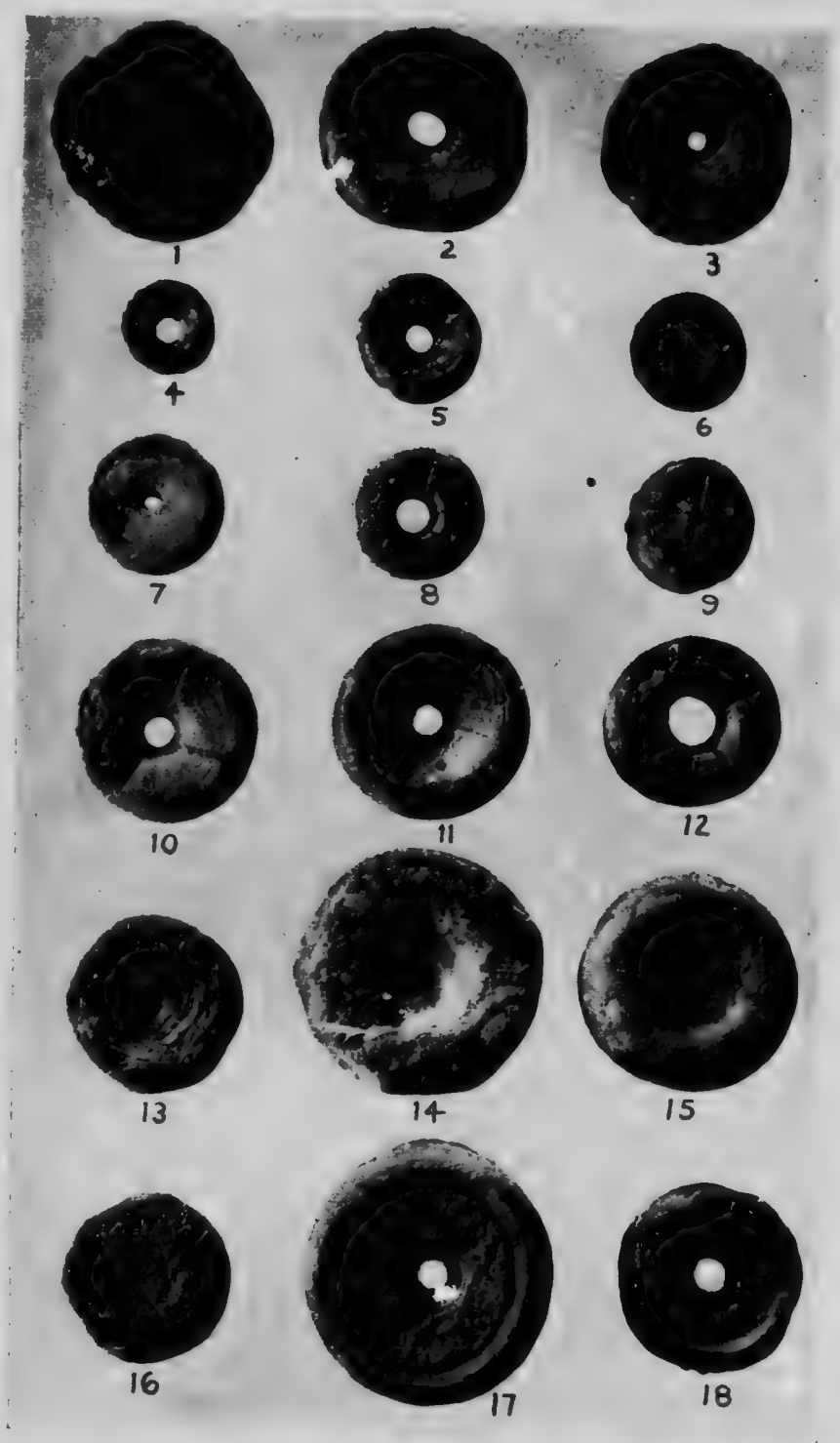
Fig. 14 (20–157b). Yellow sandstone. From general diggings of mound 1.

Fig. 15 (20–541). Gray sandstone. From general diggings of mound 2

Fig. 16 (20–540b). Reddish sandstone. From general diggings of mound 2. (See Plate LII, Fig. 2.)

Fig. 17 (20–553b). Yellow sandstone. From general diggings of mound 2. (See Plate XLI, Fig. 4.)

Fig. 18 (20–160). Yellow sandstone. From general diggings of mound 1.



Games.

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PLATE XLV. PIPES.

Fig. 1 (20–1332). Yellow sandstone. From general diggings over grave 196, in field.

Fig. 2 (20–771). Yellow sandstone bearing incised face. From near feet of skeleton 61, mound 2. (See Plate LII, Fig. 11.)

Fig. 3 (20–1109). Yellow sandstone. From general diggings of camp trench (See Plate LII, Fig. 1.)

Fig. 4 (20–1110). Limestone. From general diggings of camp trench.

Fig. 5 (20–572a). Yellow sandstone. From general diggings of mound 2.

Fig. 6 (20–1111). Limestone. From general diggings of camp trench.

Fig. 7 (20–571). Yellow sandstone. From general diggings of mound 2.

Fig. 8 (20–1297). Limestone. From right hand of skeleton 193, in field. (See Plate LIV, Fig. 12.)

Fig. 9 (20–178). Yellow sandstone. From general diggings of mound 1. (See Plate LII, Fig. 15.)

Fig. 10 (20–176). Yellowish sandstone bearing incised human face on reverse. From general diggings of mound 1. (See Plate LII, Fig. 10.)

Fig. 11 (20–967). Modeled in pottery. From general diggings of mound 3. (See Plate LVI, Fig. 10.)

Pipes.

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PLATE XLVI. PIPES — UNFINISHED AND BROKEN.

Fig. 1 (20–175). Cylinder of yellowish sandstone with dot for drilling of bowl. From general diggings of mound 1.

Fig. 2 (20–1333). Cylinder of yellowish sandstone. From general diggings over grave 196, in field.

Fig. 3 (20–173). Reddish sandstone, undrilled, bearing incised human face. From general diggings of mound 1. (See Plate LII, Fig. 12.)

Fig. 4 (20–38). Conoid form pecked from limestone with drilling for bowl begun. From surface of farm.

Fig. 5 (20–762). Monitor form, undrilled, pecked from limestone. From northwest corner of stone covers of skeleton 59, mound 2.

Fig. 6 (20–172). Monitor form, undrilled, pecked from limestone. From general diggings of mound 1.

Fig. 7 (20–570). Limestone, broken in process of manufacture. From general diggings of mound 2.

Fig. 8 (20–1279). Monitor form, undrilled, of yellowish sandstone bearing incised human form on base. From general diggings over grave 177, embankment of sink hole. (See Plate LII, Fig. 13.)

Fig. 9 (20–572b). Gray limestone. From general diggings of mound 2.

Fig. 10 (20–177). Yellowish sandstone. From general diggings of mound 1.

Fig. 11 (20–40b). Yellowish sandstone. From surface of farm.

Fig. 12 (20–40c). Limestone pipe. From surface of farm. (See Plate XXXVII, Fig. 13.)

Pipes — Unfinished and Broken.

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PLATE XLVII. PIPES — UNFINISHED.

Fig. 1 (20–568). Yellowish sandstone marked for beginning of bowl. From general diggings of mound 2.

Fig. 2 (20–26a). Yellow sandstone marked for beginning of bowl and split longitudinally. From surface of farm.

Fig. 3 (20–569). Reddish sandstone with drilling begun for both bowl and stem. From general diggings of mound 2.

Fig. 4 (20–39). Limestone in which a bowl has been begun, apparently by pecking. From surface of farm.

Fig. 5 (20–170). Yellowish sandstone. From general diggings of mound 1.

Fig. 6 (20–37). Yellowish sandstone showing marks of pecking. From surface of farm.

PIPES - UNFINISHED.

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PLATE XLVIII. PERSONAL ADORNMENT — BEADS OF POTTERY, BONE, AND SHELL, AND PENDANTS OF SHELL.

Fig. 1 (20–94a). Beads of pottery. From surface of farm. Presented by Col. Frederick H. Bierbower.

Fig. 2 (20–795). Bead made of bone. From near the left hand of skeleton 63, mound 2.

Fig. 3 (20.0–4907). Bead made of bone. From farm.

Fig. 4 (20–1159a). Bead made of bone. From general diggings of camp trench.

Fig. 5 (20.0–4908). Bead made of bone. From farm.

Fig. 6 (20–1291). Bead made of bone with incised marks. From under pelvis of skeleton 190, in field. (See Plate LIII, Fig. 2.)

Fig. 7 (20–407b). Bead made of bone. From general diggings of mound 1.

Fig. 8 (20–95a). Bead made of bone. From surface of farm. Presented by Col. Frederick H. Bierbower.

Fig. 9 (20–95b). Bead made of bone. From surface of farm. Presented by Col. Frederick H. Bierbower.

Fig. 10 (20–95c). Bead made of bone. From surface of farm. Presented by Col. Frederick H. Bierbower.

Fig. 11 (20–419b). Bead made of bone. From general diggings of mound 1.

Fig. 12 (20–924). Cylindrical beads made of shell. From neck of skeleton 121, mound 2.

Fig. 13 (20–464). Disc-shaped beads made of shell. From general diggings of mound 1.

Fig. 14 (20–446). Disc-shaped beads made of shell. From near neck of skeleton 1[illegible], mound 1.

Fig. 15 (20–838). Cylindrical beads made of shell. From right elbow of skeleton 74, mound 2.

Fig. 16 (20–1304). Beads made of marine shell. From neck of skeleton 194, embankment of sink hole.

Fig. 17 (20–944). Bead made of the columella of the busycon. From general diggings of mound 2.

Fig. 18 (20–115a). Bead made of the columella of the busycon. From surface of farm. Presented by Col. Frederick H. Bierbower.

Fig. 19 (20–867a). Bead made of olivella. From waist of skeleton 91, mound 2.

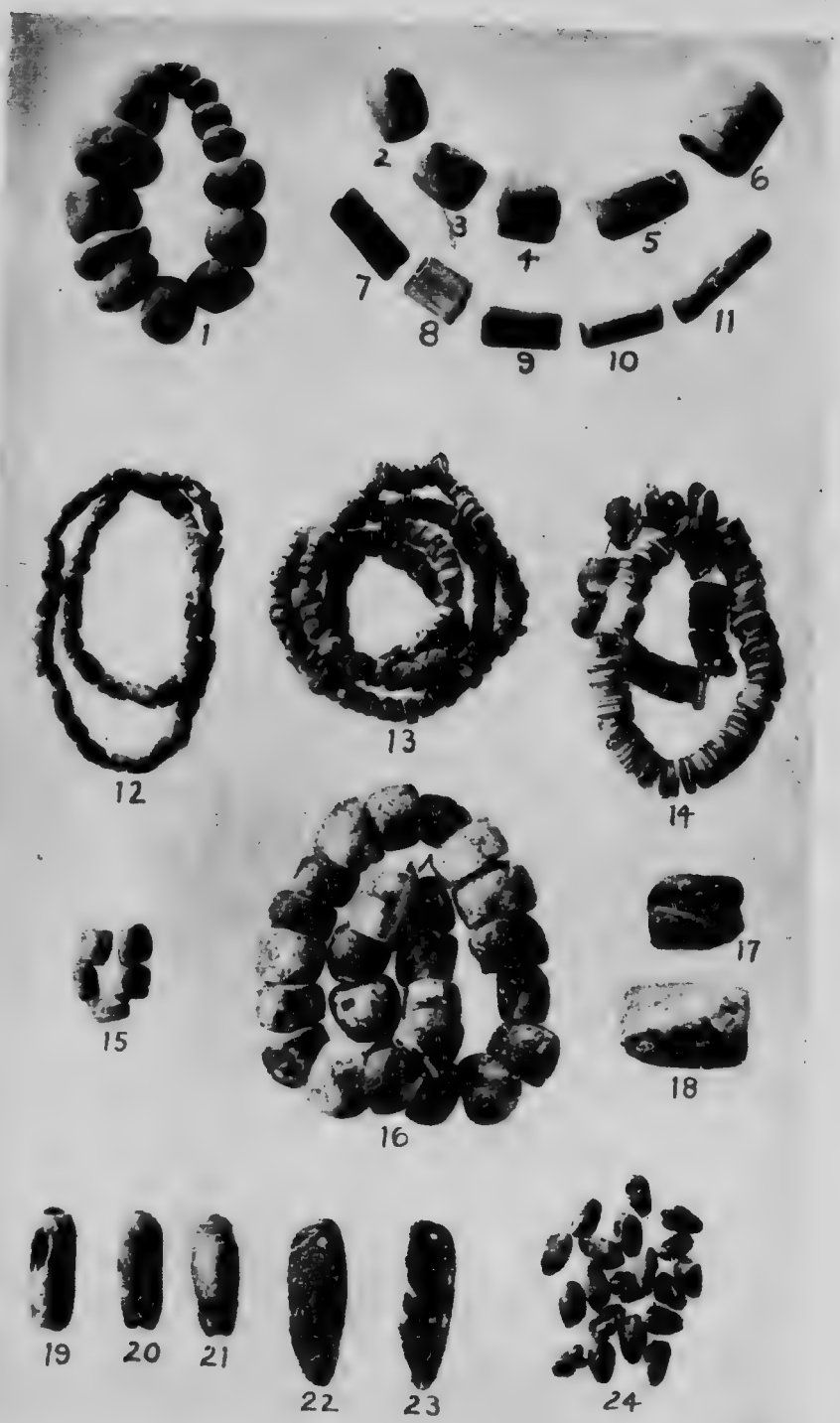
Fig. 20 (20–867b). Bead made of olivella. From waist of skeleton 91, mound 2.

Fig. 21 (20–867c). Bead made of olivella. From waist of skeleton 91, mound 2.

Fig. 22 (20–1267a). Pendant made of olivella. From breast of skeleton 178, hillside.

Fig. 23 (20–1267b). Pendant made of olivella. From breast of skeleton 178, hillside.

Fig. 24 (20–1020a). Beads made of marginella apicina. From neck of skeleton 132, mound 3.



Personal Adornment.
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PLATE XLIX. PERSONAL ADORNMENT — PENDANTS MADE OF CANAL COAL, BONE, TEETH, AND SHELL.

Fig. 1 (20–576). Claw-shaped object made of canal coal, broken at base, but with drilling started on reverse. From general diggings of mound 2.

Fig. 2 (20–88). Lozenge-shaped pendant made of canal coal. From surface of farm. Presented by Col. Frederick H. Bierbower.

Fig. 3 (20–85). Pendant made of canal coal with flattened reverse. From surface of farm. Presented by Col. Frederick H. Bierbower.

Fig. 4 (20–466a). Tooth-shaped pendant made of canal coal. From neck of skeleton 30, mound 1.

Fig. 5 (20–86b). Tooth-shaped pendant made of canal coal. From surface of farm. Presented by Col. Frederick H. Bierbower.

Fig. 6 (20–86a). Tooth-shaped pendant made of canal coal. From surface of farm. Presented by Col. Frederick H. Bierbower.

Fig. 7 (20–87). Tooth-shaped pendant made of canal coal, with ornamental dots. From surface of farm. Presented by Col. Frederick H. Bierbower.

Fig. 8 (20–1174). Pendant (?) made of a thin piece of bone with drilled or gouged perforations. From general diggings of camp trench. (See Plate LIII, Fig. 3.)

Fig. 9 (20–907). Pendants of canine teeth of at least three families of small carnivors. From neck of skeleton 105, mound 2.

Fig. 10 (20–395b). Pendant made of incisor of elk. From general diggings of mound 1.

Fig. 11 (20–105). Pendant made of canine of wolf bearing incised IIXII. From surface of farm. Presented by Col. Frederick H. Bierbower. (See Plate LIII, Fig. 6.)

Fig. 12 (20–938a). Pendant made of shell. From general diggings of mound 2.

Fig. 13 (20–1032). Claw-shaped pendant made of shell. From feet of skeleton 137, mound 3.

Fig. 14 (20–431). Pendant made of shell. From general diggings of mound 1.

Fig. 15 (20–386a). Perforated pendant made of a canine tooth of a bear. From general diggings of mound 1.

Fig. 16 (20–385b). Grooved canine tooth of a bear. From general diggings of mound 1.

Fig. 17 (20–103). Pendant made of a canine tooth of a bear. From surface of farm. Presented by Col. Frederick H. Bierbower.

Fig. 18 (20–387). Pendant made of canine tooth of a bear, with one side flattened and the other bearing zigzag incised lines. From general diggings of mound 1.

Fig. 19 (20–471). Crescent-shaped pendant made of shell. From neck of skeleton 30, mound 1.

Fig. 20 (20–111). Pendant made of shell. From surface of farm. Presented by Col. Frederick H. Bierbower.

Fig. 21 (20–427). Pendant made of shell. From general diggings of mound 1.

Fig. 22 (20–897). Pendant made of shell. From left breast of skeleton 105, mound 2.

Fig. 23 (20–434a). Tooth-shaped pendant made of shell. From general diggings of mound 1.

Fig. 24 (20–469a). Pendant made of shell, possibly intended to represent a canine tooth of an elk. From neck of skeleton 30, mound 1.

Fig. 25 (20–434b). Oblong pendant made of shell. From general diggings of mound 1.

Fig. 26 (20–109a). Circular pendant made of shell. From surface of farm. Presented by Col. Frederick H. Bierbower.

Fig. 27 (20–864a). Tooth-shaped pendant made of shell. From neck of skeleton 89, mound 2.

Fig. 28 (20–864b). Tooth-shaped pendant made of shell with incised lines and drilled dots. From neck of skeleton 89, mound 2. (See Plate LIII, Fig. 10.)

Fig. 29 (20–864c). Pendant made of shell with longitudinal incised lines. From neck of skeleton 89, mound 2. (See Plate LIII, Fig. 9.)

Fig. 30 (20–1326a). Tooth-shaped pendant made of shell with transverse perforation. From neck of skeleton 195, in field.

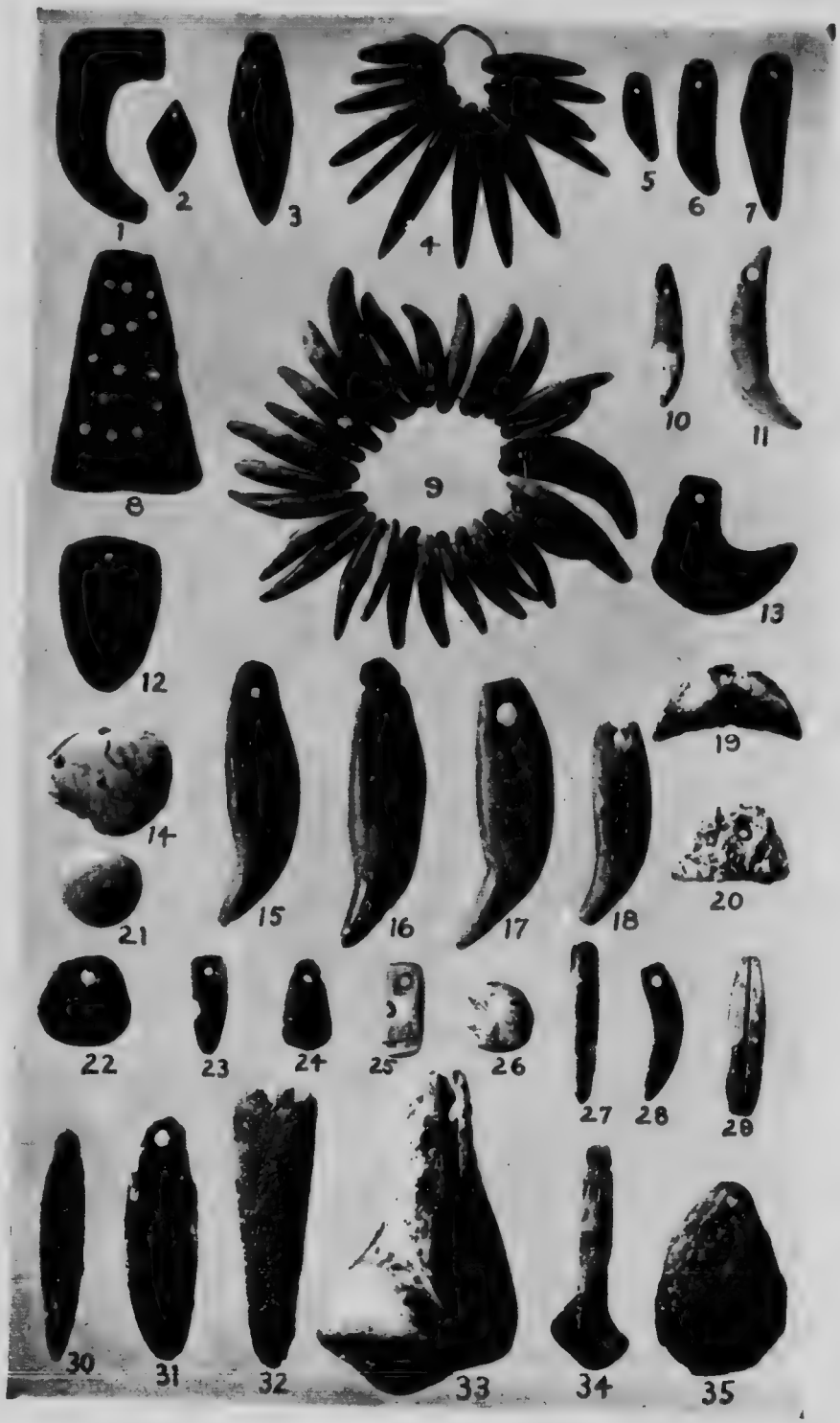
Fig. 31 (20–1070a). Pendant made of shell. From mound 6.

Fig. 32 (20–1078a). Pendant made of shell. From neck of skeleton 159, mound 6.

Fig. 33 (20–479). Pendant made of busycon shell. From left of jaw of skeleton 34, mound 1.

Fig. 34 (20–874). Pendant made of the columella of the busycon shell with groove for suspension. From skull of skeleton 95, mound 2.

Fig. 35 (20–937a). Pendant made of shell. From general diggings of mound 2.



Personal Adornment.

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PLATE L. PERSONAL ADORNMENT — ORNAMENTS MADE OF STONE, PEARL, AND SHELL.

Fig. 1 (20-1108). Fragment of a gorget made of slate. From general diggings of camp trench.

Fig. 2 (20-79). Stone disc perforated at one edge and partly perforated from each side at the opposite edge. From surface of farm. Presented by Col. Frederick H. Bierbower.

Fig. 3 (20-429). Disc-shaped pendant made of shell with two perforations and five drilled pits. From general diggings of mound 1.

Fig. 4 (20-428). Disc-shaped pendant made of shell with two perforations and bearing incised lines. From general diggings of mound 1.

Fig. 5 (20-870). Perforated shell disc bearing incised lines and pearl bead. From near clavicle of skeleton 92, mound 2.

Fig. 6 (20-112). Shell ornament with perforation in each end. From surface of farm. Presented by Col. Frederick H. Bierbower.

Fig. 7 (20-764). Perforated shell ornament. From near right arm of skeleton 60, mound 2.

Fig. 8 (20-430). Shell ornament with two perforations and notches around the edge. From general diggings of mound 1.

Fig. 9 (20-940). Perforated shell disc. From general diggings of mound 2.

Fig. 10 (20-1340a). Perforated shell disc. From general diggings over grave 196, in field.

Fig. 11 (20-941a). Perforated shell disc. From general diggings of mound 2.

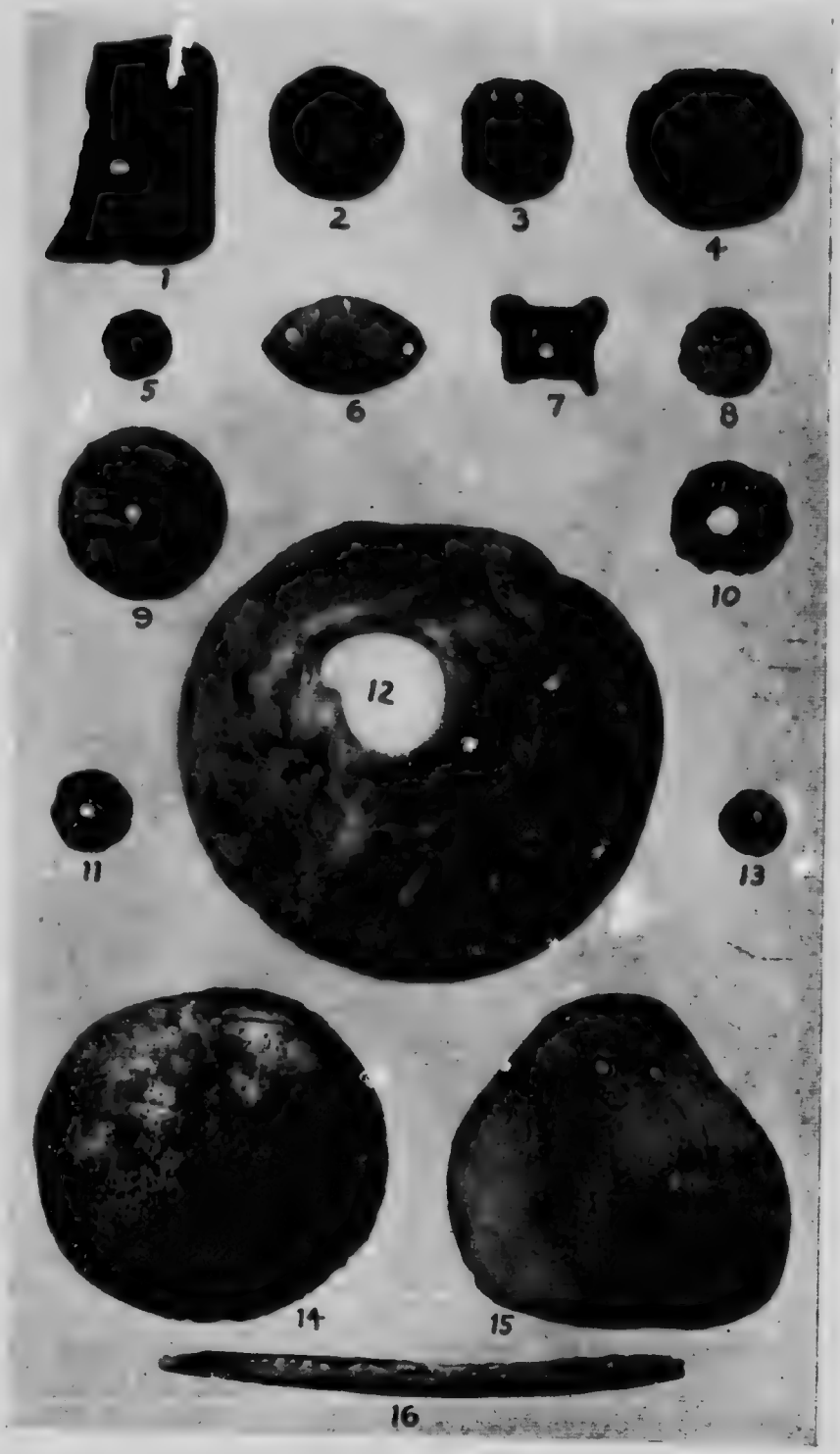
Fig. 12 (20-881). Perforated disc made of busycon shell with two small perforations for suspension. From head of skeleton 98, mound 2.

Fig. 13 (20-941b). Perforated shell disc. From general diggings of mound 2.

Fig. 14 (20-1075). Disc made of shell with two perforations for suspension. From chest of skeleton 155, mound 6.

Fig. 15 (20-1071). Pendant made of shell with two perforations for suspension. From neck of skeleton 144, mound 6.

Fig. 16 (20-1080). Pin made of shell, possibly a nose ornament. From left shoulder of skeleton 159, mound 6.



Personal Adornment.

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PLATE LI. MISCELLANEOUS OBJECTS.

Fig. 1 (20–277). Fragment of a pottery object, possibly of spool shape. From general diggings of mound 1.

Fig. 2 (20–1124a). Fragment of a pottery object, possibly of spool shape. From general diggings of camp trench.

Fig. 3 (20–171). Pecked object made of limestone, possibly an unfinished pipe. From general diggings of mound 1.

Fig. 4 (20–278). Crudely modelled pottery object of spoon shape. From general diggings of mound 1.

Fig. 5 (20–439a, b). Miniature pottery dishes. From skeleton 11, mound 1.

Fig. 6 (20–1134a, b). Small pieces of pottery. From general diggings of camp trench.

Fig. 7 (20–778). Part of the upper jaw of a bear cut off through the roots of the teeth. From near legs of skeleton 61, mound 2.

Fig. 8 (20–774). Part of the jaw of a bear cut off through the roots of the teeth. From skull of skeleton 61, mound 2.

Fig. 9 (20–312b). Piece of antler perforated at one end. From general diggings of mound 1

Fig. 10 (20–309). Perforated penis bone of a raccoon. From general diggings of mound 1.

Fig. 11 (20–686). Transversely perforated penis bone of a raccoon. From general diggings of mound 2.

Fig. 12 (20–1082). Cylinder formed of antler, possibly an unfinished knife handle. From near left tibia of skeleton 165, mound 6.

Fig. 13 (20–714a, b). Whistles made of bone. From general diggings of mound 2.

Fig. 14 (20–1161). Bone whistle or flute with one perforation on the reverse. From general diggings of camp trench.

Fig. 15 (20–734). Cylinder of bone grooved around and broken off at each end. From general diggings of mound 2.

Fig. 16 (20–337). Object made of bone with spatulate point and perforation through the base bearing mineral deposit. From general diggings of mound 1.

Miscellaneous Objects.

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PLATE LII. ART — INCISED AND SCULPTURED STONE.

Fig. 1 (20–1109). Incised lines on pipe made of yellowish sandstone. From general diggings of camp trench. (See Plate XLV, Fig. 3.)

Fig. 2 (20–540d). Incised cross on disc made of reddish sandstone. From general diggings of mound 2. (See Plate XLIV, Fig. 16.)

Fig. 3 (20–80). Incised cross in circle on disc made of reddish sandstone. From surface of farm. Presented by Col. Frederick H. Bierbower. (See Plate XLIV, Fig. 9.)

Fig. 4 (20–77). Incised lines on disc made of yellowish sandstone. From surface of farm. Presented by Col. Frederick H. Bierbower. (See Plate XLIV, Fig. 10.)

Fig. 5 (20–1097a). Incised lines and drilled pits in disc made of yellowish sandstone. From general diggings of camp trench. (See Fig. 1a.)

Fig. 6 (20–555). Incised lines and drilled pits in disc made of brownish sandstone. From general diggings of mound 2. (See Fig. 1b, and Plate XLIV, Fig. 11.)

Fig. 7 (20–275). Notches in object made of stone. From general diggings of mound 1.

Fig. 8 (20–181). Incised pictograph on slate pebble. From general diggings of mound 1.

Fig. 9 (20–965). Incised animal form on fragment of disc made of yellowish sandstone. From general diggings of mound 3. (See Fig. 1c.)

Fig. 10 (20–176). Incised human face on pipe of yellowish sandstone. Incised concentric circles and cross lines on reverse shown in Plate XLV, Fig. 10. From general diggings of mound 1.

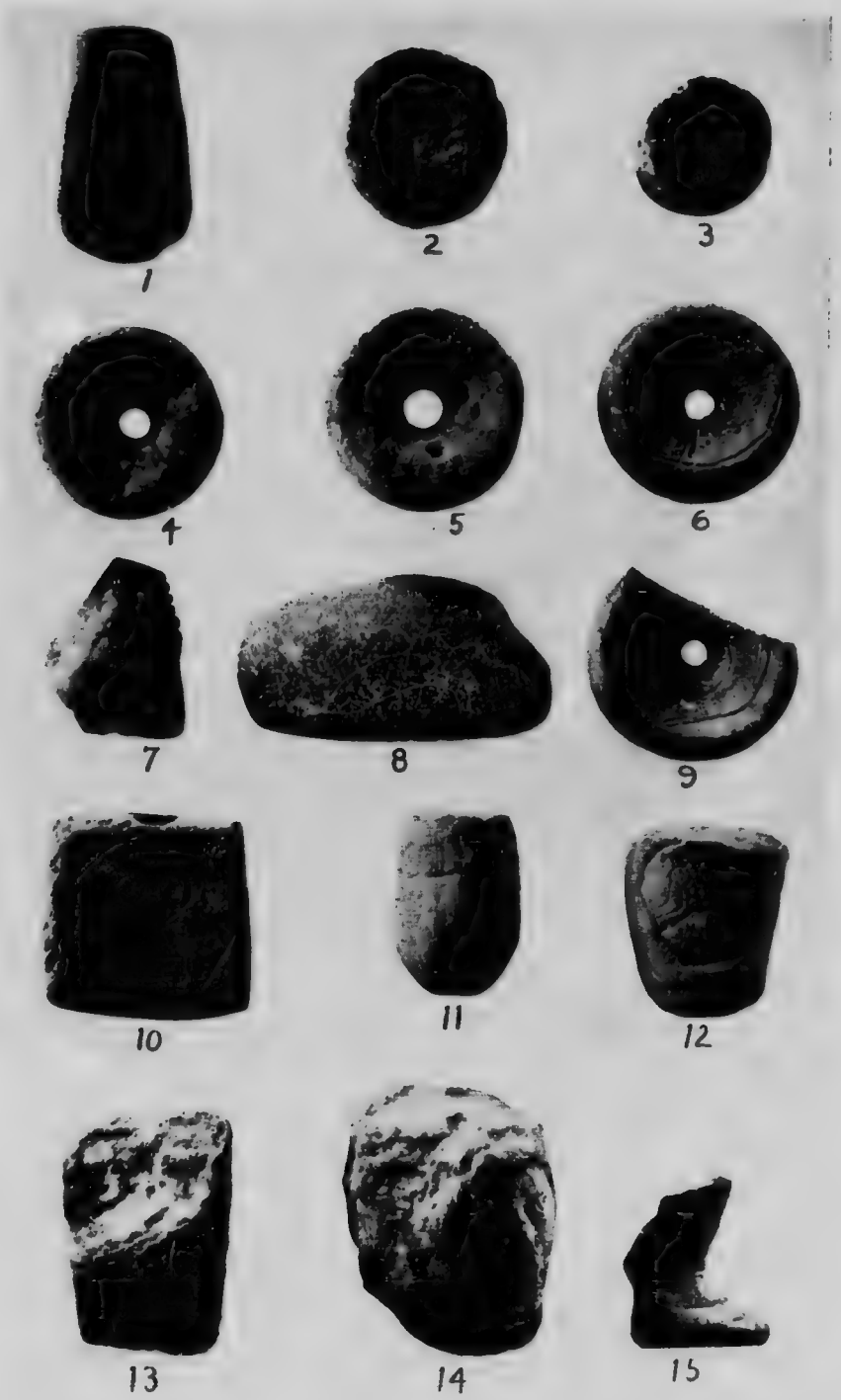
Fig. 11 (20–771). Incised face on pipe made of yellowish sandstone. From near feet of skeleton 61, mound 2. (See Plate XLV, Fig. 2.)

Fig. 12 (20–173). Incised face on conoid form of unfinished pipe made of reddish sandstone. From general diggings of mound 1. (See Plate XLVI, Fig. 3.)

Fig. 13 (20–1279). Incised human figure on base of unfinished monitor pipe made of yellowish sandstone. From general diggings over grave 177, embankment of sink hole. (See Plate XLVI, Fig. 8.)

Fig. 14 (20–573). Sculptured human face on piece of yellowish sandstone, grooved on reverse. From general diggings of mound 2.

Fig. 15 (20–178). Sculptured moccasin on fragment of a pipe. From general diggings of mound 1. (See Plate XLV, Fig. 9.)



Art — Incised and Sculptured Stone.

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PLATE LIII. ART — INCISED, NOTCHED, AND DRILLED. BONE, IVORY, AND SHELL.

Fig. 1 (20–352). Ten notches on awl made of tarsometatarsus of a wild turkey. From general diggings of mound 1.

Fig. 2 (20–1291). Incised bead made of bone. From under pelvis of skeleton 190, in field. (See Plate XLVIII, Fig. 6.)

Fig. 3 (20–1174). Drilled or gouged perforations in pendant made of bone. From general diggings of camp trench. (See Plate XLIX, Fig. 8.)

Fig. 4 (20–727.) Notches and drilled pits on fragment of spatulate object made of bone. From general diggings of mound 2.

Fig. 5 (20–1338). Incised XIII X on pendant made of canine tooth of a wolf. From general diggings over grave 196, in field.

Fig. 6 (20–105). Incised IIXII on pendant made of canine tooth of a wolf. From surface of farm. Presented by Col. Frederick H. Bierbower. (See Plate XLIX, Fig. 11.)

Fig. 7 (20–1178). Incised IIIXIII on pendant made of canine tooth of a bear. From general diggings of camp trench.

Fig. 8 (20–932). Notches in edge of unio shell. From general diggings of mound 2.

Fig. 9 (20–864c). Incised longitudinal line on pendant made of shell. From neck of skeleton 89, mound 2. (See Plate XLIX, Fig. 29.)

Fig. 10 (20–864b). Incised line and drilled pits on claw-shaped pendant made of shell. From neck of skeleton 89, mound 2. (See Plate XLIX, Fig. 28.)

Art — Incised, Notched, and Drilled.

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PLATE LIV. ART — MODELED AND PAINTED ON POTTERY, SCULPTURED IN STONE.

Fig. 1 (20–228a). Modeled row of points on rim of pot. From general diggings of mound 1.

Fig. 2 (20–1124b). Modeled knob with central depression on fragment of pottery. From general diggings of camp trench.

Fig. 3 (20–91). Modeled bird head from rim of pot. From surface of farm. Presented by Col. Frederick H. Bierbower.

Fig. 4 (20–272). Modeled bird head from rim of pot. From general diggings of mound 1.

Fig. 5 (20–55). Modeled bird head from rim of pot. From surface of farm.

Fig. 6 (20–92). Modeled bird head from rim of pot. From surface of farm. Presented by Col. Frederick H. Bierbower.

Fig. 7 (20–622). Modeled bird head from rim of pot. From general diggings of mound 2.

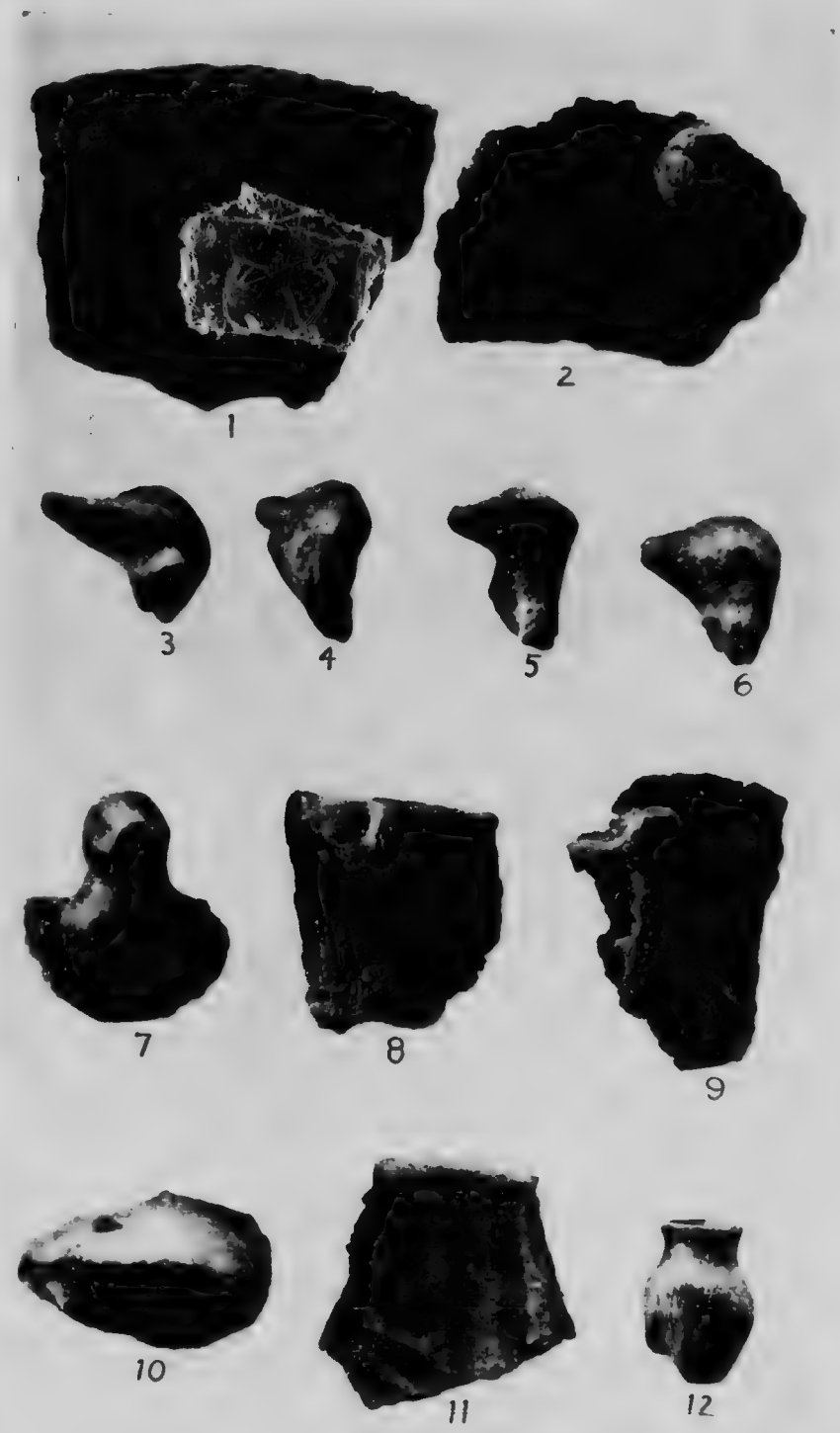
Fig. 8 (20–1127). Modeled human face on rim of pot. From general diggings of camp trench.

Fig. 9 (20–619). Modeled lizard-like form in pottery. From general diggings of mound 2.

Fig. 10 (20–623). Modeled fish-like form in pottery. From general diggings of mound 2.

Fig. 11 (20–270). Line design painted in brown on pottery. From general diggings of mound 1.

Fig. 12 (20–1297b). Pipe of stone of artistic shape. From right hand of skeleton 193, in field. (See Plate XLV, Fig. 8.)



Art.

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PLATE LV. ART — DECORATIONS ON POTTERY DERIVED FROM PROCESSES OF MANUFACTURE.

Fig. 1 (20–624c). Rows of finger impressions on pottery. From general diggings of mound 2.

Fig. 2 (20–591). Finger nail impressions on pottery. From general diggings of mound 2.

Fig. 3 (20–616). Rows of finger nail impressions on rim and neck of pot. From general diggings of mound 2.

Fig. 4 (20–246a). Fing tip and nail impressions on neck of pot. From general diggings of mound 1.

Fig. 5 (20–1125a). Fold of clay to form rim showing row of finger tip and nail impressions equally spaced to press fold into place. From general diggings of camp trench.

Fig. 6 (20–254a). Fold of clay to form rim of pot showing row of finger tip impressions equally spaced to press fold into place. From general diggings of mound 1.

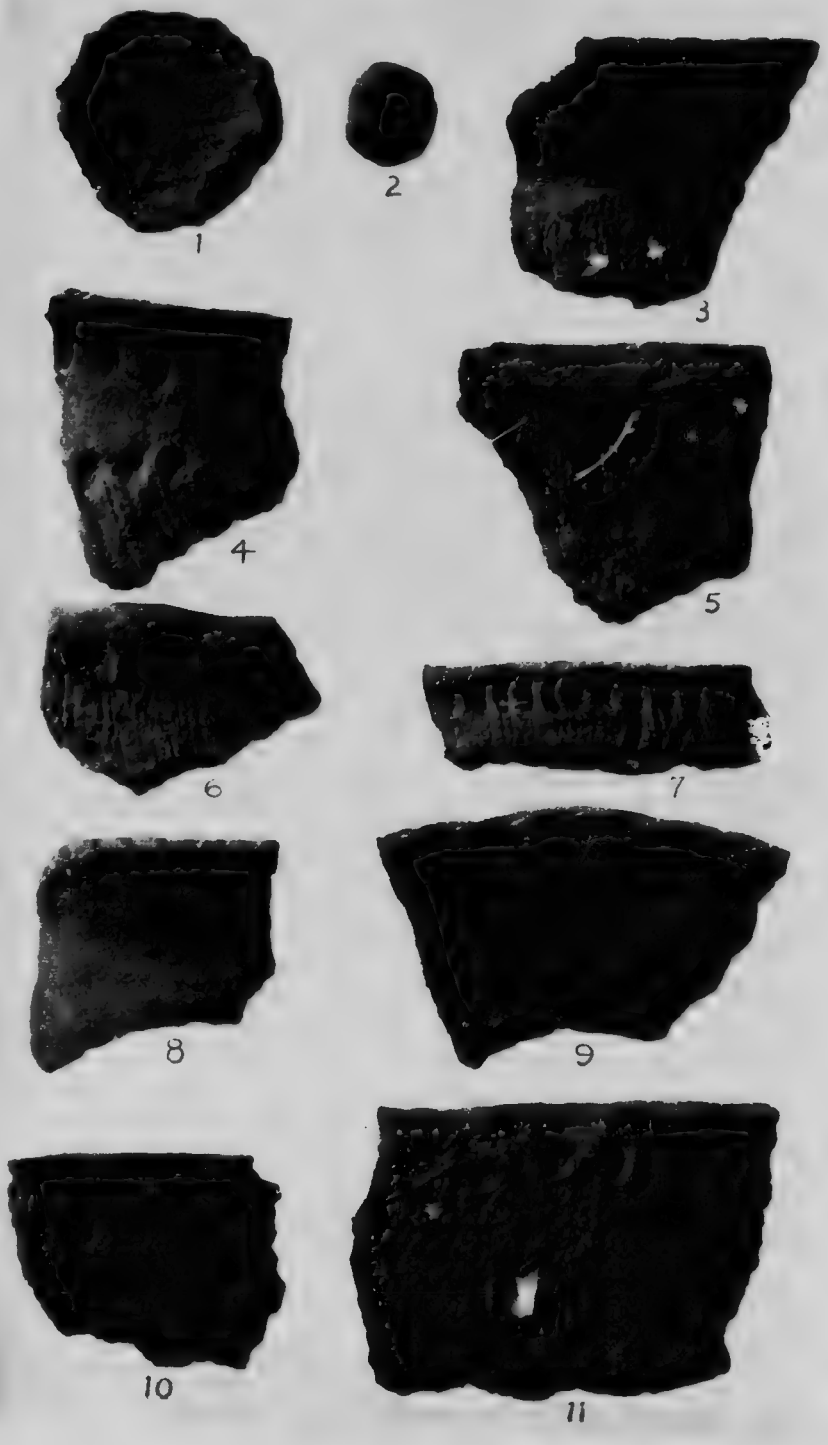
Fig. 7 (20–235a). Fragment of rim of pot showing row of impressions resembling finger tips. From general diggings of mound 1.

Fig. 8 (20–1125b) Fragment of rim of pot showing finger tip and nail impressions. From general diggings of camp trench.

Fig. 9 (20–617). Fragment of rim of pot showing diagonal impressions of finger tips. From general diggings of mound 2.

Fig. 10 (20–248a). Fragment of rim of pot showing fold of clay and rows of impressions equally spaced. The lower row is apparently made with a tool. The upper row possibly an imitation of finger tip impressions. From general diggings of mound 1.

Fig. 11 (20–244a). Fragment of rim of pot showing fold to form rim and row of impressions, equally spaced to press fold into place. From general diggings of mound 1.



Art.
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PLATE LVI. ART — PRESSED AND INCISED DESIGNS ON POTTERY.

Fig. 1 (20–602a). Fragment of rim of pot with pressed notches. From general diggings of mound 2.

Fig. 2 (20–1125c). Fragment of rim of pot with pressed notches. From general diggings of camp trench.

Fig. 3 (20–1125d). Fragment of rim of pot with row of modeled points. From general diggings of camp trench.

Fig. 4 (20–243a). Fragment of rim of pot with row of modeled points. From general diggings of mound 1.

Fig. 5 (20–600a). Fragment of rim of pot bearing ridge incised into notches before firing. From general diggings of mound 2.

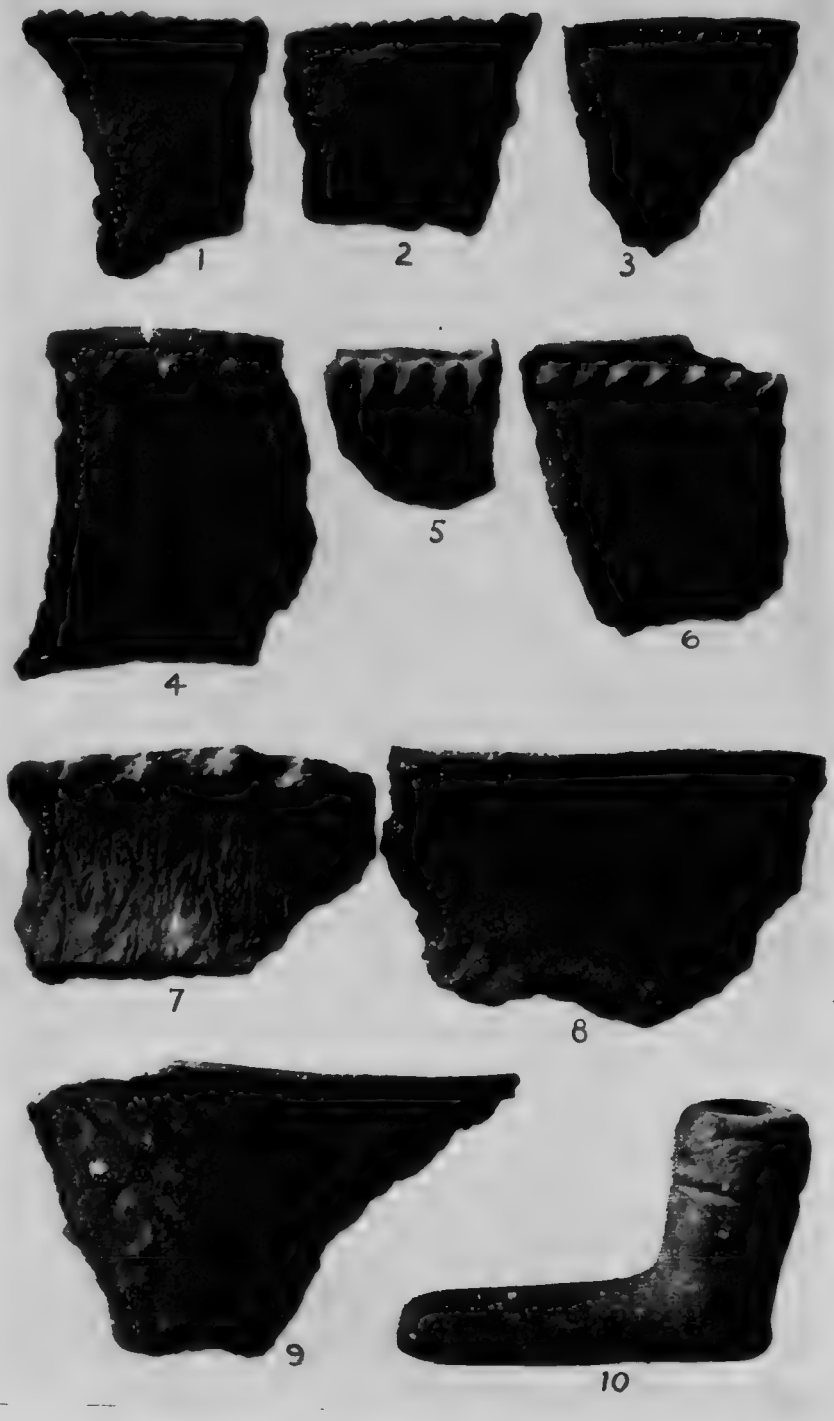
Fig. 6 (20–268). Fragment of rim of pot bearing ridge incised before firing into notches. From general diggings of mound 1.

Fig. 7 (20–1125e). Fragment of rim of pot bearing row of modeled points. From general diggings of camp trench.

Fig. 8 (20–600b). Fragment of rim of pot bearing design apparently drawn in the clay with the finger or a blunt implement. From general diggings of mound 2. (See Fig. 1g.)

Fig. 9 (20–618). Fragment of rim of pot bearing design apparently drawn in the clay with the finger or a blunt implement. From general diggings of mound 2. (See Fig. 1f.)

Fig. 10 (20–967). Pipe made of pottery bearing two encircling grooves between which are five dots all apparently made by drawing and pressing in the clay with a blunt implement. From general diggings of mound 3. (See Plate XLV, Fig. 11.)



Art.

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PLATE LVII. ART — INCISED POTTERY.

Fig. 1 (20–245a). From general diggings of mound 1.
Fig. 2 (20–237a). From general diggings of mound 1.
Fig. 3 (20–245b). From general diggings of mound 1.
Fig. 4 (20–1125f). From general diggings of camp trench.
Fig. 5 (20–246h). From general diggings of mound 1.
Fig. 6 (20–248b). From general diggings of mound 1.
Fig. 7 (20–602b). From general diggings of mound 2.
Fig. 8 (20–230). From general diggings of mound 1.

Art — Incised Pottery.

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PLATE LVIII. ART — INCISED POTTERY.

Fig. 1 (20–242d). From general diggings of mound 1.
Fig. 2 (20–202a). From general diggings of mound 1. (See Fig. 1d.)
Fig. 3 (20–251a). From general diggings of mound 1.
Fig. 4 (20–817). From above grave 70, mound 2.
Fig. 5 (20–240b). From general diggings of mound 1.

Art — Incised Pottery.

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PLATE LIX. ART — INCISED POTTERY.

Fig. 1 (20–201). From general diggings of mound 1. (See Fig. 1e.)
Fig. 2 (20–600c). From general diggings of mound 2.
Fig. 3 (20–1125g). From general diggings of camp trench.
Fig. 4 (20–203). From general diggings of mound 1.

Art — Incised Pottery.

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PLATE LX. METHOD OF BURIAL — MOUND.

Fig. 1 Neg. 42702 (181, 865). Mound 2 containing many stone graves. From the south. Stake B 3, to left; B 2, in foreground; C, in middle foreground; B 1, near stump to right; B 4 beyond center, not shown.

Fig. 2 Neg. 42700 (179, 860). Altar 2, mound 1. From the west.

Method of Burial — Mound.

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PLATE LXI. METHOD OF BURIAL — SKELETONS IN MOUNDS.

Fig. 1 Neg. 42706 (185, 869). Skeletons flexed and at length in mound 1. From the west. Skeletons 34, 47, 40, 33, 32, 26.

Fig. 2 Neg. 42724 (203, 890). Skeleton 83, rock heap and grave 87, mound 2. From the west. Stake C shows near shovel at center of mound. Stake B 1 shows at right upper [illegible].

Method of Burial.—Skeletons in Mounds.

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PLATE LXII. METHOD OF BURIAL — STONE GRAVES.

Fig. 1 Neg. 42742 (222, 911). Grave 188. From the northeast. Stake 2 shows in background. Mound 6 outside of grave beyond top of grave 188.

Fig. 2 Neg. 42743 (223, 912). Skeleton at length in grave 188. From the north northeast.

Method of Burial — Stone Graves.

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PLATE LXIII. METHOD OF BURIAL — STONE GRAVES.

Fig. 1 Neg. 42732 (211, 900). Grave 137 before removing any stones. From the west Stake 1 shows in right foreground.

Fig. 2 Neg. 42740 (220, 909). Skeleton 178 on stone pavement. From the south. Stake 2 shows in left background.

Method of Burial — Stone Graves.

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PLATE LXIV. METHOD OF BURIAL — DOUBLE BURIAL.

Fig. 1 Neg. 42716 (195, 880). Skeleton 70, partly covered with bones of skeleton 77. From the west. Stake marking grave 71 shows near knife.

Fig. 2 Neg. 42717 (196, 881). Same as Fig. 1 after bones of skeleton 77 had been removed. From the west.

METHOD OF BURIAL — DOUBLE BURIAL.

PLATE LXIV. METHOD OF BURIAL — DOUBLE BURIAL.

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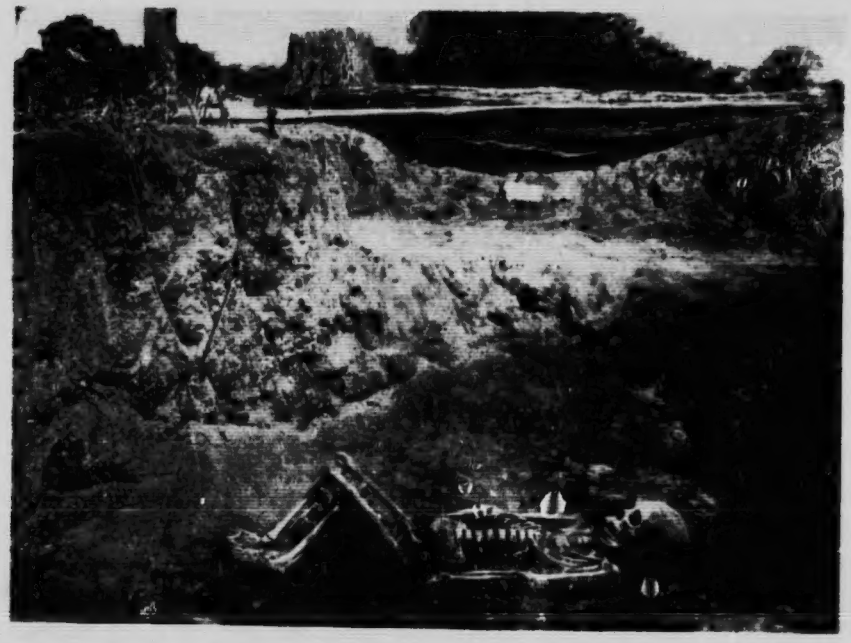

Method of Burial — Double Burial.

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